

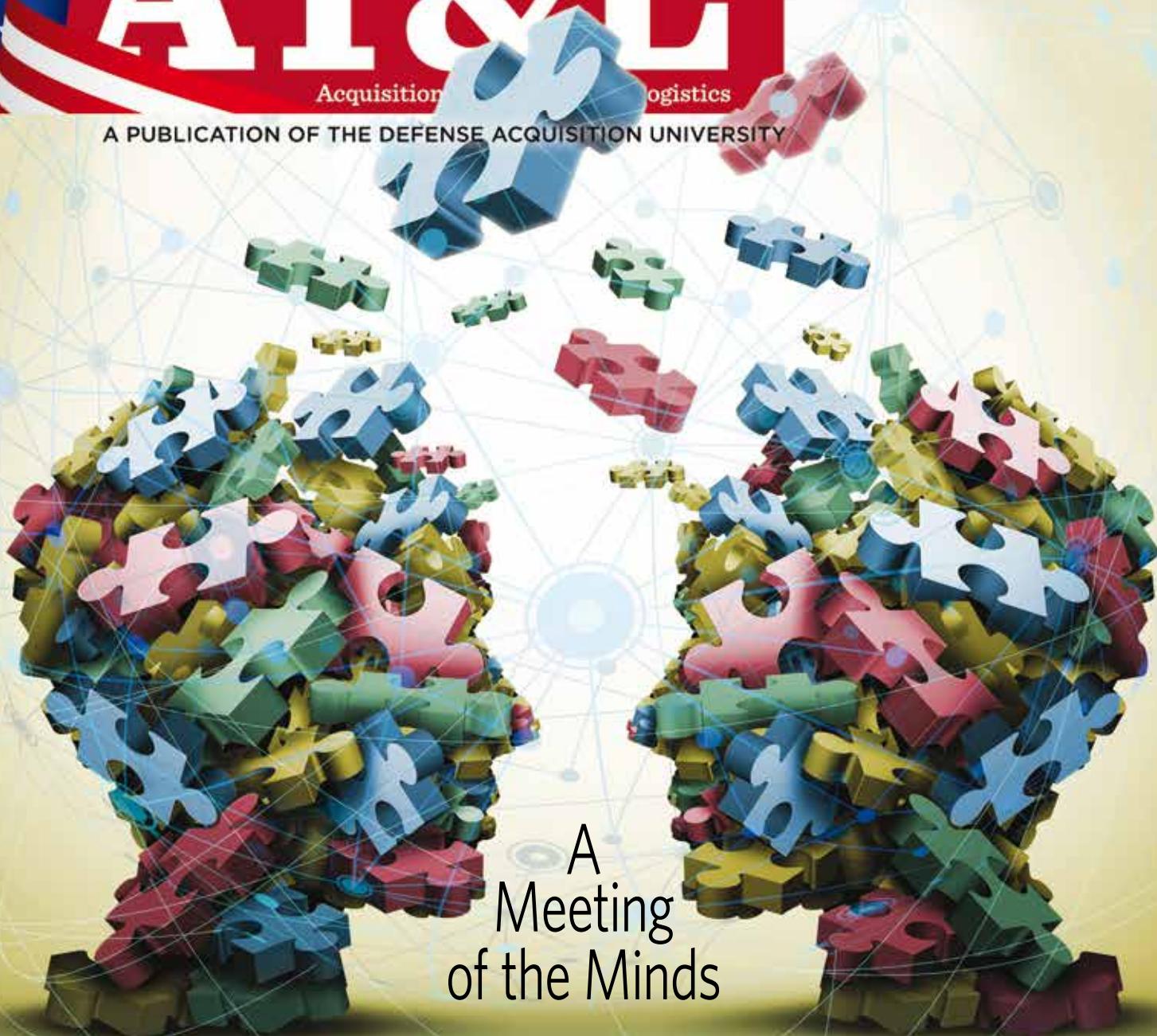


Defense

AT&L

Acquisition  Logistics

A PUBLICATION OF THE DEFENSE ACQUISITION UNIVERSITY



A Meeting of the Minds

Expanding Training and Understanding
Between Industry and Government

DEFENSE LOGISTICS AGENCY
A New Strategy for a
New Environment

Disaster Preparedness
in DoD

Converting Data
Into Decisions

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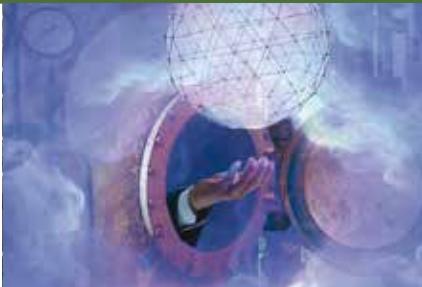
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A Meeting of the Minds

**Expanding Training and Understanding
Between Industry and Government**

Capt Keith W. O'Donnell, USAF



The Department of Defense (DoD) and defense industry conglomerates are inundated with talented professionals who strive for excellence. In order to improve the acquisition process, the DoD and defense industry both need to come to a better understanding of each other's business processes and motivators. This can be accomplished by jointly analyzing existing acquisition processes on a recurring basis and offering more opportunity for joint training between industry and the government.

An example of a best practice occurred during my Education With Industry assignment when Lockheed Martin's Joint Air to Surface Standoff Missile (JASSM) team and the Air Force JASSM Program Office (JPO) completed a successful process improvement initiative that provided a transparent explanation of both the contractors and governments contracting and proposal procedures via process mapping. The team identified improvements that shrank the timeline of requirements determination, proposal preparation, and contract negotiation—and dramatically improved the relationship. The DoD should encourage program offices to engage in similar initiatives on a recurring basis to better synchronize processes and expectations with their counterparts.

It would be beneficial to implement a jointly attended in-residence training course tailored for Program Management, Logistics, Contracting, and Financial Management personnel at the mid-career and action officer level to bridge the existing educational gap concerning business acumen/processes and financial motivators. I believe the course should be mandatory for Acquisition Professional Development Program Level II certification. In addition to making the process more robust, more immersion will build long-lasting personal relationships, networking opportunities, and begin a cultural paradigm shift for the DoD and industry.

Problem Overview

Government Accountability Office (GAO) audits support the view that DoD is challenged by acquisition programs requiring significantly greater time than expected, with higher-than-estimated costs, while producing fewer-than-requested capabilities. The October 2015 report, "Joint Action Needed by DoD and Congress to Improve Outcomes," GAO-16-187T, found that "It is not unusual for time and money to be underestimated by 20% to 50%," largely because the requirements typically direct contractors to invent solutions and those requirements are not properly vetted or based on realistic expectations. Our taxpayers and our warfighters expect better outcomes. They deserve better results. The flaws within our acquisition process are not isolated in a single area but have many aspects ripe for improvement. Despite implementing overarching policy and reform initiatives, such as the Better Buying Power series begun in 2010 (see <http://bbp.dau.mil>), changing the acquisition culture has proven to be a very challenging effort. Our current acquisition process does not operate with the urgency commensurate with emerging threats. The major reason for the slowness of the acquisition process is the customer's

O'Donnell serves as the chief of cost analysis for the Special Operations Forces and Personnel Recovery Division at Wright-Patterson Air Force Base in Ohio. Prior to his current assignment, he worked as a program manager at Lockheed Martin in Orlando, Florida, as an Education With Industry fellow. He is a Certified Defense Financial Manager and an active member of the American Society of Military Comptrollers. The views expressed are those of the author and do not necessarily reflect the official position of the U.S. Air Force, the U.S. Government or the defense industry partner.

Table 1. Comparison of PMs' Challenges in 2014 Versus 2009

Percentage of 2014 versus 2009 program managers (PMs) answering yes to "Was the acquisition training sufficiently practical and comprehensive to enable you to manage or deal effectively with [each of these 22 PM challenges]?"

Challenges	Yes		Difference Between 2014 and 2009
	2014	2009	
Performing/Using Earned Value	81%	37%	+44
Understanding and Using Government Financial Reports	75%	55%	+20
Systems Engineering Process Challenges	71%	53%	+18
Dealing with Technical Requirements	64%	51%	+13
Attaining Technical Requirements	56%	43%	+13
Responding to Inquiries from Outside DoD	56%	53%	+3
Conducting Test and Evaluation	56%	51%	+5
Managing Risk and Opportunity	56%	49%	+7
Implementing Logistics/Product Support	56%	45%	+11
Responding to Directed Changes in Schedule	56%	41%	+15
Responding to OSD Inquiries	54%	55%	-1
Dealing with Contracts on a Program	53%	59%	-6
Overseeing Contractor Performances	53%	31%	+22
Responding to User Requirements	51%	41%	+10
Responding to Military Service Inquiries	51%	63%	-12
Understanding and Using Contractor Financial Reports	49%	39%	+10
Developing Cost Estimates	44%	27%	+17
Responding to Directed Changes in Funding	42%	43%	-1
Conducting Source Selections	39%	45%	-6
Dealing With Cost Growth	32%	14%	+18
Managing Software Development	24%	25%	-1
Implementing Cost Controls	24%	25%	-1
Average	52%	43%	+9

Source: Department of Defense 2014 Study of Program Manager Training and Experience, Aug. 21, 2014.

and contractor's inability to clearly and exactly define and articulate the warfighter's needs.

The defense marketplace largely operates as a duopolistic monopsony where multiple suppliers compete for the business of one buyer (see U.S. Air Force Col. David L. Peeler's "Biotech Business Lessons for Defense Acquisition," *Strategic Studies Quarterly*, summer 2016). With only one buyer dictating requirements, the cost, schedule and technical risk impacts of undefined, ambiguous, or changing Request for Proposals (RFPs) can prevent the success of both the customer and the

contractor. Unclear requirements do not allow contractors to propose an approach with balanced cost, schedule and technical scope. And this leads to confusion, an undefined baselined capability, and resentment when the contractor cannot deliver within cost or schedule.

The June 2015 report, "Military Service Chiefs' Concerns Reflect Need to Better Define Requirements before Programs Start," GAO-15-469, found that, "Most service chiefs told the GAO they were concerned that after weapon system requirements are handed to the acquisition process,



... Changing the acquisition culture has proven to be a very challenging effort. Our current acquisition process does not operate with the urgency commensurate with emerging threats.

requirements are changed or added by the user and/or acquisition community (sometimes referred to as 'creep'), increasing the capabilities and cost of the system." This report focused exclusively on major defense acquisition programs with research, development, and test and evaluation costs of more than \$480 million and procurement costs of more than \$2.79 billion. My experience at Lockheed Martin (working both Army and Air Force programs) supports the view that this is a systemic issue. The best way to attack cost and schedule is to develop an in-depth understanding of the requirement early and "design in" the ability to be more agile vis-a-vis requirements change by utilizing bucket pricing, incremental or block upgrades, open architecture, etc. In order for us to be good stewards of taxpayer dollars, our nation must dedicate our precious resources to recruiting, training and retaining highly qualified personnel to lead us through the overhaul of the defense acquisition process.

The 2014 DoD "Study of Program Manager Training and Experience" asked 59 acquisition program managers (PMs), "Is acquisition training sufficiently practical and comprehensive (other than on-the-job training) to enable you to manage or deal effectively with this challenge?" Table 1 illustrates that seven challenges failed to receive more than a 50 percent "yes" response in both the 2009 and the most recent survey. However, many improvements have been made since the last survey and improvement should continue as DAU and the DoD enhance training curricula. The seven areas that did not receive a greater than 50 percent "yes" response focused principally on how PMs and their business teams create, interpret and utilize cost and financial information. Respondents also generally agreed that, "We need to understand what goes on in the minds of industry. Program managers need to know what industry managers tell their owners and their investors about their government programs and their financial condition." This knowledge can be difficult for government workers to obtain, especially if they lack public-sector business experience. Industry has available a constant supply of separated or retired military and DoD civilians who are familiar with the government mindset and processes. But the government does not recruit and retain as many personnel with a deep knowledge of industry practices at all acquisition levels. Bridging the learning gap is critical as budgets are getting smaller, near-competitor threats are appearing more quickly, and efficient solutions need to be developed and delivered to the warfighter sooner.

The Air Force Smart Operations of the 21st century process improvement initiative included cost estimators and contracting officers from Lockheed Martin's JASSM Program and the Air Force's JPO. The changes were intended to overlay the Lockheed Martin and JPO acquisition process to identify efficiencies in developing and coordinating Statement of Objectives (SOO) and/or RFP requirements, establish a faster, standardized timeline for proposal actions, and determine what could be accomplished earlier or parallel to accelerate preparation, negotiations and award.

The team mapped each of their current states and both the JPO and Lockheed Martin appreciated the understanding gained of each other's internal processes, which enabled them to see how certain actions had unintended negative effects on the other party. Neither party earlier had a thorough understanding of how the other operated and therefore spent a great deal of time waiting for the action/responses of the other party before starting their own process. A Pareto Analysis revealed that a majority of negotiations were spent on materials, so Lockheed Martin invited the JPO to attend its subcontractor negotiations to gain a clearer insight into the cost positions. The JASSM program relationship had previously been strained, but this initiative helped improve matters. It allowed the teams to recognize the frustrations and challenges each side faced, internally and externally, and established the framework for developing processes, behaviors, and understanding to improve the acquisition process.

Implementing the future state (ideal process roadmap) requires PM involvement at the earliest stages in order to acquire an understanding of what technology is maturing through the Air Force Research Laboratory, the Defense Advanced Research Projects Agency (or other government research and development or internal industry research and development). It also placed more emphasis on PMs prioritizing their requirements so that the contracting and estimating teams gain greater insight into the warfighter's critical needs and can systematically work on the highest priorities. This will deliver the "biggest bang for the buck" for limited time and money, and, all in all, the contractual timeline is expected to be cut by approximately 40 percent (or 9 months). Both organizations realized considerable benefit by working through the challenges in person of clearer communication, including body language, immediate clarity, and iterated thinking.



We have not developed a way to train PMs and their industry and government teams to work together effectively at the action officer level.

Current State

DAU delivers high-caliber training on various aspects of government acquisition, but the 2014 study on PM training, as well as my experience with industry, both indicate that there is still room for improvement. DAU offers two classes specifically targeted toward industry processes and contractor strategy:

- Acquisition Management (ACQ) 315—Understanding Industry (Business Acumen)
- Business, Cost Estimating and Financial Management (BCF) 205—Contractor Business Strategies

A DAU professor of ACQ 315 described the course as an “MBA in a week” that covers the depth of the content “a mile wide and an inch deep.” Action officers from both industry and government need this training when they reach 4 to 10 years of experience, so they possess the requisite knowledge when they materially impact development and execution of contract vehicles. BCF 205 has a strong syllabus that discusses how industry manages doing business with the federal government against myriad stakeholders (private investors, stock price, government customer, taxpayers, etc.). This balancing act impacts their strategies and financial positions and provides a conflicting motivator not shared by the government: profit. This course has almost no government PM participation because it is not required for PMs’ certification, even though it would be very valuable to their development. ACQ 315 is mandatory for PMs, Contracting, and Logistics Level III certification, but there is no required industry focused training at Level I or II. We have not developed a way to train PMs and their industry and government teams to work together effectively at the action officer level. More collaboration is needed between industry and government employees in a formalized training environment.

The Lockheed Martin Liaison to DAU provides Lockheed Martin guest speakers at DAU events and courses, hosting of DAU faculty members at Lockheed Martin training courses, and coordinates DAU class quotas and submits candidates (senior PMs, directors and vice presidents) for DAU courses, specifically PMT 401, PMT 402 and ACQ 404. It is very difficult for industry students to commit the required 10 weeks to PMT 401, but the course is highly regarded by those who do attend it. It is very important that these senior-level courses have industry representation. But greater communication and

interaction throughout all levels of an organization raises the entire industry’s chances of success. Industry must invest in its personnel by sending more students to joint training at DAU, but also leverage industry’s own internal training platforms and allocate slots for government personnel and encourage their attendance.

Recommendations

We must enable opportunities for DoD personnel to train and learn alongside industry contractors. This will promote a better common understanding of each other’s business and financial motivations, and prevent us from “talking past each other.”

Program offices and their contractor counterparts should engage on a recurring basis (annually) to review existing business management processes and collectively brainstorm opportunities for improvement. Standardizing the process and expectations based on a common understanding will improve the acquisition process, as well as the relationship.

Enormous interest exists among defense industry senior leadership to increase the opportunities available for employees at all levels to engage with DoD personnel in a non-competitive, structured educational environment. Miscommunication can be prevented by fostering a non-retributive environment where industry and DoD personnel exchange ideas and perspectives freely.

The DoD should expand upon existing training forums and establish a 1-week industry relations and business acumen course with participation split 50-50 between industry and government students. Successful comprehension of the course material should be a requirement for Level II certification for the Program Management, Logistics, Contracting and Financial Management career fields.

Benefits Attained

In completing Lockheed Martin’s Fundamentals of Program Management training course, I had the opportunity to witness the contractors’ training regimen and the value associated with joint training. It was an important contribution to gaining an understanding of how Lockheed Martin trains its PMs in their responsibilities throughout the program life cycle—implementing successful performance planning and management, developing strong business acumen and methods for delivering top-notch customer value. An

Defense AT&L Wins MarCom Gold Award

Defense AT&L magazine has won another award—its sixth in the last 4 years.

The Association of Marketing and Communications Professionals (MarCom) declared *Defense AT&L* a Gold Winner as a government print publication. The magazine received the statuette depicted here for this achievement. This and a number of other 2017 awards were announced officially on Nov. 1. These awards represent strong validation of the work done at Defense Acquisition University (DAU) as well as the specific activities of the magazine's staff.

MarCom, headquartered in Dallas, Texas, is a new award source for Defense AT&L.

In June 2017, *Defense AT&L* scored its fourth APEX award for publications excellence, and in 2016 also won a Blue Pencil and Gold Screen award from the National Association of Government Communicators as well as its third APEX award.

MarCom states that it reviewed about 6,000 publications "from corporate marketing and communication departments, advertising agencies, PR firms, design shops, production companies and freelancers.... [with] a range in size from individual communicators to media conglomerates and Fortune 500 companies."

The *Defense AT&L* award names managing editor Benjamin Tyree, art director Tia Gray and the DAU's editorial, graphics and production teams for their work on the publication. Members of the team include Debbie Gonzalez, Frances Battle, Nina Austin, Noelia Gamboa, Michael Shoemaker, and Collie Johnson, all of whom work within DAU's Visual Arts and Press unit headed by director Randy Weekes.



Those of us who spend most or much of our time working on the magazine accept this award. But, more broadly, this award recognizes the contributions of many others.

Among our greatest assets are the collective experience and wisdom of DAU's professors and members of the Defense Acquisition Workforce. These are our authors and our subject-matter experts. We work closely with them to bring about the best and most professional presentation of their work. Their articles help them to extend their voices beyond the classroom and maintain a constant dialogue within the workforce aimed at continual improvement.

We encourage submissions, comments, letters and other forms of acquisition

discussion in our pages. Sharing experiences and lessons learned is, again, a good, practical way to improve the work we are involved in. We believe this involvement not only facilitates cross-pollination of ideas and experiences among established professionals but also the general training mission of DAU.

Defense AT&L won this latest award for its May-June 2017 issue. That issue featured articles about improving threat support for defense acquisition programs, the Army's use of rapid prototyping, and an ongoing series focused on Earned Value Management—including the lead article titled "The Power of Data."

Defense AT&L's sister publication, the *Defense Acquisition Research Journal*, and its staff of editors and illustrators, also won a Gold Award from MarCom this year—which further demonstrates the publishing world's growing recognition of the great quality of DAU's products.

—Benjamin Tyree, managing editor

extraordinary amount of benefit could be gained by the government and industry through cross-pollinating key acquisition concepts at the action officer level. Inherent risks and challenges confront both the customer and contractor, and it is imperative that we understand the mindset of the business partner in order to reach a successful and mutually satisfactory outcome. The benefits of this proposed training initiative cannot be quantified easily, but the training undoubtedly will allow acquisition professionals to work more effectively to deliver combat capabilities to the warfighter. Specific benefits that we could realize include:

- Minimizing administrative expenses due to contract/proposal modifications and changes

- Achieving affordable government proposals through reduced risk considerations
- Shortening the proposal, fact-finding, and negotiation schedule—and delivering combat capability earlier
- Building a stronger partnership and culture on the basis of trust, transparency and tact
- Providing the warfighter with needed weapons and capabilities on time and at an affordable price—and satisfying the warfighters' technical specifications and Concept of Operations
- Supporting the Better Buying Power methodologies and approach by teaching acquisition workforce members their practical applications

&

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A New Strategy for a New Environment

Melissa Bohan



Enhanced industry, government and allied partnerships, rapid delivery of mission capabilities, and an enduring global presence are key objectives in the new Defense Logistics Agency (DLA) strategic plan for 2018 through 2026. The plan highlights the agency's commitment to providing responsive, agile and innovative support to warfighters and its other customers.

In a move championed by its new director, Army Lt. Gen. Darrell Williams, DLA has refreshed its plan to guide the agency as it meets ever-evolving logistics challenges in today's strategic environment as well as emerging global requirements.

As DLA developed its new strategic plan, the director challenged his leaders to remember why the organization exists and why it serves, a concept he took from Simon Sinek's book, "Start with Why." The subordinate commanders and staff members' response to that question—"service to the warfighter and the nation"—readily met the task to recognize the *why*, just as they identified the *what* and the *how*, with the goal of leading DLA to improve its mission understanding, performance and outcomes.

Bohan is a public affairs specialist for the Defense Logistics Agency at Fort Belvoir, Virginia. She has more than 22 years of public affairs experience as a civilian working for the Department of Defense and the U.S. Army.



The plan features five strategic priorities supporting the agency's mission to provide innovative logistics solutions to its global customers. These priorities also reinforce DLA's key role in supporting Secretary of Defense James Mattis' three lines of effort needed to remain the world's preeminent fighting force. DLA's priorities, as shown in Figure 1, are:

- **Warfighter First:** Strengthen Service and combatant command readiness and lethality
- **Global Posture:** Prepared for immediate action
- **Strong Partnerships:** Leverage the Joint Logistics Enterprise, interagency, industry, and partner and allied nations
- **Whole of Government:** Support to the nation
- **Always Accountable:** Assured supply chain, financial, and process excellence

Throughout the strategy, DLA's fundamental theme is its constant commitment to the core mission—supporting the military Services and combatant commands—by

embracing "Warfighter First" as the agency's top strategic priority. This theme directly aligns with the first line of effort by the Department of Defense (DoD) to restore military readiness while building a more lethal force.

To sustain its military customers, DLA's objectives emphasize supporting the DoD Nuclear Enterprise to ensure that the deterrence forces remain safe and reliable—and actively participating in war games and exercises to ensure that DLA always is ready to meet the warfighters' logistics needs. DLA will do everything possible to ensure readiness and lethality across the end-to-end supply chain by reducing risk and improving security and resiliency—using cutting-edge technology, data, trend analysis, predictive algorithms and communication to consistently predict and position the right logistics solutions on time, every time. DLA aims to gain a quick understanding of warfighters' current needs and the ability to anticipate their future needs, which will earn the warfighters' trust by easing and speeding their work with the agency.

Figure 1. Defense Logistics Agency Strategic Priorities



One of DLA's goals is the continued improvement of its command and control structure and responsiveness to its military customers' needs. Through its regional commands in Europe, the Middle East and the Pacific, DLA provides an essential presence for customers in those regions. As a former DLA customer, Williams recognizes the importance of a single point of entry into an extensive organization like DLA.

"DLA has done a great job of streamlining its operations over the last four or five years, and this concept will continue to pay significant dividends," said Williams.

Another key area the agency's new plan emphasizes is its global posture and presence. DLA will better enable its military partners to protect and serve U.S. interests around the world by obtaining for their use the right items, in the right quantities, at the right time. DLA also will strive, through flexible and scalable logistics solutions, to enhance its support of non-defense customers and our nation during disaster relief and humanitarian operations.

DLA recognizes that accomplishing those goals requires positioning resources for rapid use, making additional capability deployable, and using flexible contracting and procurement tools to help its partners meet their missions.

Over the last several years, the agency has increased its support and rapid deployment capability to global crises. This has included providing much-needed fuel, food, water, medicine and other critical supplies in response to the Ebola crisis in Liberia, Hurricanes Sandy and Matthew and, most recently, Hurricanes Harvey, Irma and Maria.

"These situations demand a rapid-response capability that is much more than ad hoc—something that is planned, something that is a systemic part of what we do. This growing rapid-response requirement must be more prominently reflected in our strategic plan," Williams said.

In supporting recent hurricane relief, DLA deployed more than 100 people to work alongside the Federal Emergency Management Agency (FEMA) and other federal agencies, augmenting logistics support and providing forward command-and-control capability.

Some of the staff provided were members of the DLA's rapid deployment teams. DLA has three full-time teams of volunteers ready to deploy on short notice. There are 13 members from DLA headquarters and its major subordinate commands on each team, representing each of DLA's supply chains, as well as distribution, disposition, information technology, expeditionary contracting and legal services.

DLA's relief efforts also included members of all three of DLA's expeditionary distribution teams that until the 2017 hurricanes had not deployed simultaneously in response to a natural disaster. The teams helped FEMA and military units receive, store and manage staging areas as thousands of trucks filled with food, water, personal hygiene kits and other critical supplies arrived on military bases for distribution to those in need.

DLA's other support included providing more than 2 million gallons of jet fuel, diesel, gas, and propane; millions of bottles of water; millions of meals ready to eat and shelf-stable meals that can be stored to meet ongoing needs; thousands of cots, sleeping bags, and tents; thousands of maps; hundreds of generators; and hundreds of different types of pharmaceuticals to support the Navy hospital ship USNS *Comfort*'s relief efforts.

The agency also helped link up contractors with military units requiring storm debris cleanup.

DLA's priority to develop and leverage strong partnerships with its global customer base reinforces DoD's second line of effort in strengthening alliances and attracting new partners, fostering economic growth and providing avenues for peace. It includes collaborating with the Joint Logistics Enterprise, interagency partners and allied nations, developing solutions that optimize DLA support to sustainment operations, leveraging relationships with industry to ensure a robust and capable industrial base, and generating innovative and efficient solutions to maintain a secure and resilient supply chain. Underlying these objectives is the need to actively engage and remain transparent with organizations that oversee the agency.

DLA's response in times of crisis directly relates to a renewed emphasis in its strategic plan on the agency's "whole of government" support to other federal departments and agencies such as FEMA, the Departments of Homeland Security, State, Energy and Interior and the U.S. Forest Service. These partner organizations have leveraged DLA's expertise in supply chain management and its global supply network to provide food, fuel and medical supplies for disaster relief efforts and non-food items for refugees in the Middle East. The agency also procures and stores equipment such as hand tools, batteries, shovels and hoses, providing critical support of the Forest Service effort to fight wildfires and deal with other fire-related emergencies.

As DLA continues expanding these partnerships and capabilities, it also will evaluate solutions that provide the best value for the government from the contributions of other agencies. DLA recognizes the importance of participating in federal initiatives designed to make agencies operate more efficiently, effectively and at reduced taxpayer cost.

In pursuing its goal of being "always accountable," DLA's tasks include reinforcing a cost-conscious and process-oriented culture to ensure efficient, effective and reliable operations; attaining and sustaining auditability through process excellence; innovating to achieve the best value logistics solutions and strengthening risk assessments to ensure secure, agile and resilient combat logistics support. The foundation for DLA's success is in auditable, innovative and sound business processes that obtain and retain the nation's confidence, which directly aligns with the DoD's third line of effort by instilling business reforms in its budget, requirements and acquisition processes.

These five strategic priorities outline what the agency must do to meet its mission to sustain warfighter readiness and lethality, delivering proactive global logistics in peace and war. The new strategic plan underlines the fact that the key to mission success across these priorities is its people and culture—for the agency's plan must be carried out by people. They are the

core of each agency goal and objective and, most importantly, each solution.

"I think people do best in organizations where they feel valued, where they feel empowered and where they feel that what they do makes a difference. They understand the why," Williams said. &

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MDAP/MAIS Program Manager Changes

With the assistance of the Office of the Secretary of Defense, *Defense AT&L* magazine publishes the names of incoming and outgoing program managers for major defense acquisition programs (MDAPs) and major automated information system (MAIS) programs. This announcement lists recently reported leadership changes for both civilian and military program managers.

Navy/Marine Corps

CAPT Dan Mackin relieved **Sean Burke** as program manager for the MQ-4C Triton (PMA 262) on Sept. 5, 2017.

Air Force

Col Robert F. King relieved **Col John D. Bedingfield** as program manager for the Base Information Transport Infrastructure Wired Program on July 1.

Ronnie L. Carter relieved **James J. Nally** as program manager for the Air Force Integrated Personnel and Pay System Program on Aug. 5.

Scott E. Boyd relieved **Magdy M. Sorial** as program manager for the C-130J Hercules Program on Sept. 1.

Col Kevin L. Sellers relieved **Col James R. Echols** as program manager for the C-5 Reliability Enhancement and Re-engining Program on Aug. 1.

Mr. Richard A. Walley relieved **Col Luke G. Cropsey** as program manager for the Massive Ordnance Penetrator Program on Sept. 1.

Col Stephen G. Purdy relieved **Brig Gen Philip A. Garrant** as program manager for the Enterprise Space Battle Management Command and Control Program, the Joint Space Operations Center Mission System Increment 2 Program, and the Space Fence Ground-Based Radar System Increment 1 Program on Sept. 1.

Disaster Preparedness in DoD

Hurricanes and Terrorist Attacks Require the Same Preparations

Eugene A. Razzetti

While working as a military analyst, I was tasked to evaluate the performance of five Navy bases along the Gulf Coast before, during and after Hurricanes Katrina, Rita and Wilma. To nobody's surprise, I found that, uniformly, the facility commanders prepared for the disaster, defended the facility as best they could and then broke out and helped the surrounding communities. Each command had assigned emergency managers—all of them experienced and professional. The fact that so many civilian employees stayed to protect the facilities rather than their own homes is especially noteworthy.

However, although each commander reported training had been provided for the ever-likely Gulf hurricanes, few admitted to having trained for man-made (e.g., biological or chemical) attacks. But the good news is that, when you train for one, you automatically train for the other. The primary difference is that you can't watch terrorist attacks developing for a week on the Weather Channel.

Razzetti is a retired Navy captain, management consultant, International Organization for Standardization auditor, and military analyst. He is the author of five management books, including "Hardening by Auditing," a handbook for improving the security management of any organization.



Air Commandos prepare to evacuate 19 medical students from the island of Montserrat after the area was devastated by Hurricane Maria, Sept. 23, 2017.

Air Force photo by Tech. Sgt. Shawn Nickel



Figure 1. Disaster Preparedness/Contingency Planning Continuum



Tables and figures by the author

Titles like contingency planning, emergency planning and disaster preparedness, often are used interchangeably. Each title is meaningful only when defined in terms of the organization to which its measures are applied. Disaster preparedness planning, by whatever title, should never be thought of as cosmetic or externally mandated expenditures of time and funding. Rather, it is an indispensable component of normal management processes—one that hardens the organization, as shown in Figure 1.

As Figure 2 implies, disaster preparedness requires:

- Identification of every aspect and requirement of the organization, including all missions—under both normal and emergency situations

- Continuous feedback between the planning and execution of those normal and emergency operations
- Establishment of goals, objectives, metrics, and measures of effectiveness with which to assess the feedback and identify/analyze gaps between the actual and the required
- The ability to process the results of the gap identification and analyses
- A continuous improvement imperative and mindset, to motivate and optimize the entire process.

If you think contingency planning strongly resembles regular organizational planning, you would be right.

Proactive organizations establish, implement and maintain appropriate plans and procedures (e.g., backing up critical documentation) for responses to emergencies, and to prevent and/or mitigate the consequences associated with their loss.

Figure 2. The Contingency Continuum



Emergency responses may be considered normal responses at increased speeds. It follows, therefore, that normal operations must be compatible with (if not identical to) emergency responses.

Emergency response plans and procedures should include all information dealing with identified services or facilities that may be required during or after incidents, disruptions, or emergency situations to restore a continuity of operations. Emergency plans need to include built-in indicators or “tripwires” and preplanned responses for on-scene commanders to use when satisfied that predetermined criteria have been met.

The military helped solve the problem of too many plans and not enough planning and the practice of execution by committee. The answer was the concept of situational awareness—the ability to recognize a situation (or change in a situation), identify and

assess the options, select courses of action, and translate them into “actionable” orders. Military commanders and program managers maintain situational awareness when they share—internally and externally—the same operational (or big) picture. Deviations and fluctuations are recognized rapidly by personnel on the scene who are in a position to take corrective actions almost immediately.

Natural and man-made disasters have many things in common. The impact of a natural or man-made incident to an organization can be minor, major or disastrous—depending on the organization’s ability to foresee that incident, defend against it, and mitigate its effects as quickly and safely as possible. Impacts may involve loss of assets, loss of mission readiness, mission cancellation or loss of life—and almost certainly damage to the country’s strategy, position and (possibly) its international commitments. Figure 2 describes the sequence of events of a natural or man-made disaster.

Scrupulous risk assessment and impact analyses enable organizations to recognize what needs to be done before an incident occurs, in order that it may manage its way through consequences without unacceptable losses or delays, and restore normal operations as quickly as possible. Impact analysis is a necessary sub-set of an organization’s Risk Management program and helps enable the organization to measure impacts in terms of mission and operations.

A terrorist attack on a military facility can be as deadly and as damaging as a hurricane; loss of a sewage treatment system could yield the same (or worse) results as a biological attack.

Contractor facilities (shipyards, factories) with large Department of Defense (DoD) contracts are as critical to DoD missions and as vulnerable to attack as military facilities—maybe even more so. They are an essential component of the mission, and program managers must satisfy themselves that contractors are doing all they can to bring programs to safe, secure, and timely completion.

Table 1 shows mission-related activities required at military facilities, whether the anticipated threat is natural or man-made. Table 2 (which is not all-inclusive) describes disruptions, natural or man-made, that can not only degrade facility missions, but could also render them both ineffective and uninhabitable. In any kind of disaster, natural or

Table 1. Required Security-Related Activities at Military Facilities

Required Activity	Natural	Man-Made	Mission Degrading
Threat identification	X	X	X
Critical mission activities identification	X	X	X
Interoperability/interdependency of tenant commands	X	X	X
Risk/vulnerability assessment	X	X	X
Critical infrastructure	X	X	X
Facilities/resources protection	X	X	X
Personnel safety and quality of life	X	X	X
Achieve/maintain an acceptable state of training	X	X	X
Control/mitigation development	X	X	X

Table 2. Degradation or Loss of Mission Capability From Natural or Man-Made Disruptions

Mission Support (Suspended or disrupted)	Natural	Man-Made	Mission Degrading
Electrical power	X	X	X
Storm water and sewer systems	X	X	X
Ground transportation	X	X	X
Air transportation	X	X	X
Supply chain management	X	X	X
Intranet/Internet	X	X	X
Medical treatment/response	X	X	X
Perimeter security	X	X	X
Feeding/berthing	X	X	X
Command and control	X	X	X

man-made, the ability of the on-scene commander to enter into contracts or purchase goods is indispensable.

A Disaster Preparedness Contingency Plan Evolves

The paragraphs and tables that follow outline necessary skill sets for future-oriented commanders and program managers. Figure 3 describes development of the contingency plan.

Security Risk Assessment and Management

Security risk assessment, like any other focused risk assessment scheme, requires the identification and quantification of threats, criticalities, and vulnerabilities of the organization and its missions. In my article on Risk Management in the July-August 2016 issue of *Defense AT&L* magazine, I laid out building a simple but highly useful spreadsheet model. Figure 4 describes fundamental risk assessment.

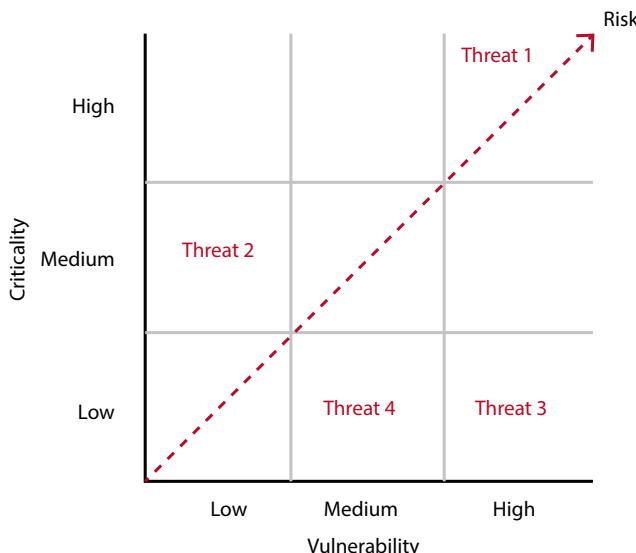
It is in executing (or gaming) control measures or mitigations that risk assessment becomes risk management, which is as important in security as it is in productivity or cost control.

Military and civilian facilities must establish and maintain an ongoing strategy to identify, assess, and mitigate facility risks, including those related to security. Mitigation means identification and implementation of effective control and corrective action. It is in executing (or gaming) control measures or mitigations that risk assessment becomes risk management, which is as important in security as it is in productivity or cost control.

Figure 3. Evolving the Contingency Plan



Figure 4. Assessing and Managing Risks



In conducting structured risk assessments, risks are identified, as well as their effects and interactions; contingency plans and courses of action are developed, including pre-emptive responses to mitigate or reduce the potential damage. Expected costs can be reduced, and an appropriate balance achieved between costs and risk exposure, usually with a reduced risk exposure. Feedback into the design and planning stages is developed as part of the evaluation of risk vs. expected cost balance—and opportunities and responses are recognized and gamed in advance.

Facility “Quick Looks”

Here are some particular check points for forward-looking commanders, program managers, and private sector security managers trying to reduce the vulnerability (or attractiveness) of a military or contractor facility:

- Intrusion detection system
- Fences, security lighting, natural barriers
- Closed-circuit TV
- Computer backup systems, firewalls
- Roof and ventilation duct accessibility
- Construction material and thickness requirements
- Installed firefighting systems
- Roads and alleys
- Parking areas
- Locks, doors and access control
- Identification management (i.e., employees, customers, vendors)
- Utilities (including uninterruptible power systems)
- Safes, desks, filing cabinets, controlled exclusion areas
- Hazardous material generation and management
- Vehicle surveillance and security (including delivery and fuel trucks)
- Proximity of emergency services (e.g., fire, medical, police)
- Mail and package processing

As a former naval station commanding officer, I recommend doing a quick look once per week, before an expected major

weather event, and whenever (for any reason) there is an increased security posture.

Benchmarking and Gap Analysis —Ask Good Questions and Act

Benchmarking and gap analysis can be described as seeking out, identifying and attempting to emulate and improve on established standards, contract requirements or other best practices. Auditors use them to compare actual organizational performance with established standards; they then determine the reasons for the gaps and the required corrective actions, as suggested in Figure 5.

Internal benchmarking examines activities taking place inside the fence line, such as manufacturing, training, waste management, or work in progress. External benchmarking can include mission performance metrics (on-time delivery, reliability/defect reports, etc.).

Commanders and program managers will not know the results of their decisions or changes without an effective benchmarking strategy, to help determine how an organization is performing relative to how it should do so (i.e., define the performance gap).

Checklists

Robust, comprehensive, checklists make audit findings complete, accurate and actionable—even when they are used by inexperienced auditors working against an immoveable deadline.

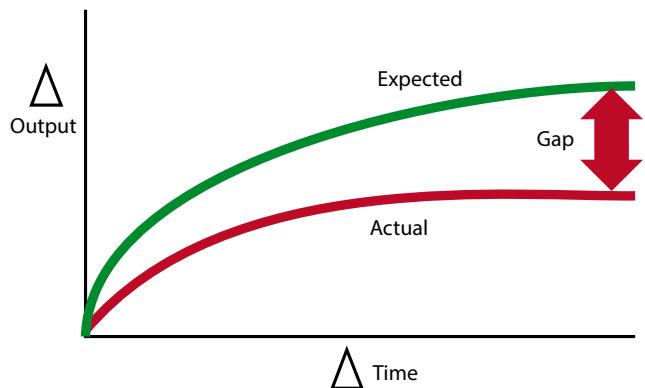
Table 3 is a section of a general purpose facility disaster preparedness checklist, from which to develop more focused checklists.

Incident Response Plans and Tasks

Each site should maintain a response plan and task list, including:

- Structured checklists of prioritized actions to assess/restore continuity
- The personnel responsible for executing the responses
- The procedure to be used for rendering decisions on site
- Personnel to be consulted before emergency actions
- Personnel to be consulted after incident response
- Personnel assignments
- Mobilization of external resources
- Communication plans
- Manual workarounds (if required) for system recoveries

Figure 5. Benchmarking and Gap Analysis



Natural or man-made disasters can force a headquarters to relocate intelligence collection and decision making away from the disaster. Many readers may think that a term like tactical operations center (or TOC) sounds more military than civilian. They are correct—the use of the term started with the military. However, a civilian “TOC-like” operation located on or near a contractor facility offers potentially tremendous value for safety, security and mission fulfillment.

Disaster preparedness plans, as modified for each site, should include operating procedures, with flowcharts,

Table 3. Section of a Disaster Preparedness Checklist

Number	Item	Yes	No	N.A.
1	Control of access to the facility			
2	OPs available as needed			
3	Risk Assessments developed for different threats, vulnerabilities, criticalities, and courses of action			
4	Car/truck bomb defenses developed/understood			
5	Perimeters establish for all nodes (a) Security forces posted (b) Sensors in place/tested			
6	Emergency evacuation procedures developed/understood			
7	Control of locks/keys established			
8	Alarms/duress codes in use			
9	Primary and alternate communications established with all stations			
10	Weather predictions known and considered			
11	Stowaway searches conducted			
12	Threat assessment conducted			

checklists and pre-planned responses to manage the immediate consequences of a mission disruption. This management must ensure that individual safety remains paramount throughout recovery and restoration, reflects the results of a risk and impact analysis strategy, structure strategic and tactical options for rapid execution, prevents further or subsequent loss or unavailability of critical activities, and supports remaining resources.

It is important to remember that disaster recoveries are not measured in terms of days or hours, but rather in terms of re-establishments or re-achievements of previously defined objectives, such as the resumption of mission, activity or service performance after an incident.

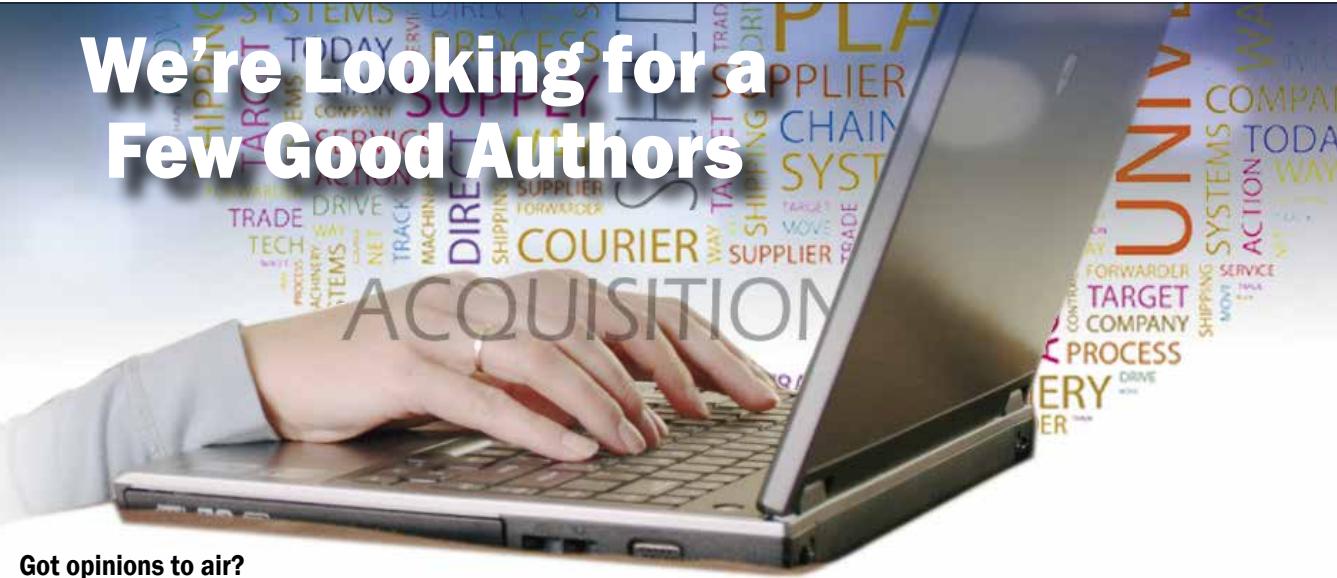
"Recovery" is, for our purposes, the transition from disaster response back to an acceptable state of business or operational normalcy. Recovery can (and should) create a new normal, the goal of which is higher, not lower, expectations of performance and productivity. Forward-thinking commanders and program managers should plan on rebuilding better, with absolutely no thought given to settling for less or lowering the bar.

Moreover, managers must have a viable recovery strategy before a disaster, not after. Remind yourselves of the past failings of municipal planners (e.g., after Hurricane Katrina), who didn't start to plan recoveries until it was time to recover. A viable recovery strategy (again, planned from the beginning) can be subdivided into overlapping phases by related commands or organizations.

The goal of "restoration" is to go beyond the status quo and use an "unsolicited" opportunity to measurably improve the structure, robustness and sustainability of the (ultimately) restored organization—as well as the community and the lives of stakeholders.

Planning must be done with the end results envisioned—and focus not only on mitigating the immediate effects of disasters but on increasing resistance to future disasters. Similarly, the organization's planning should be linked to the surrounding community's planning—and the goals of both should be the same. &

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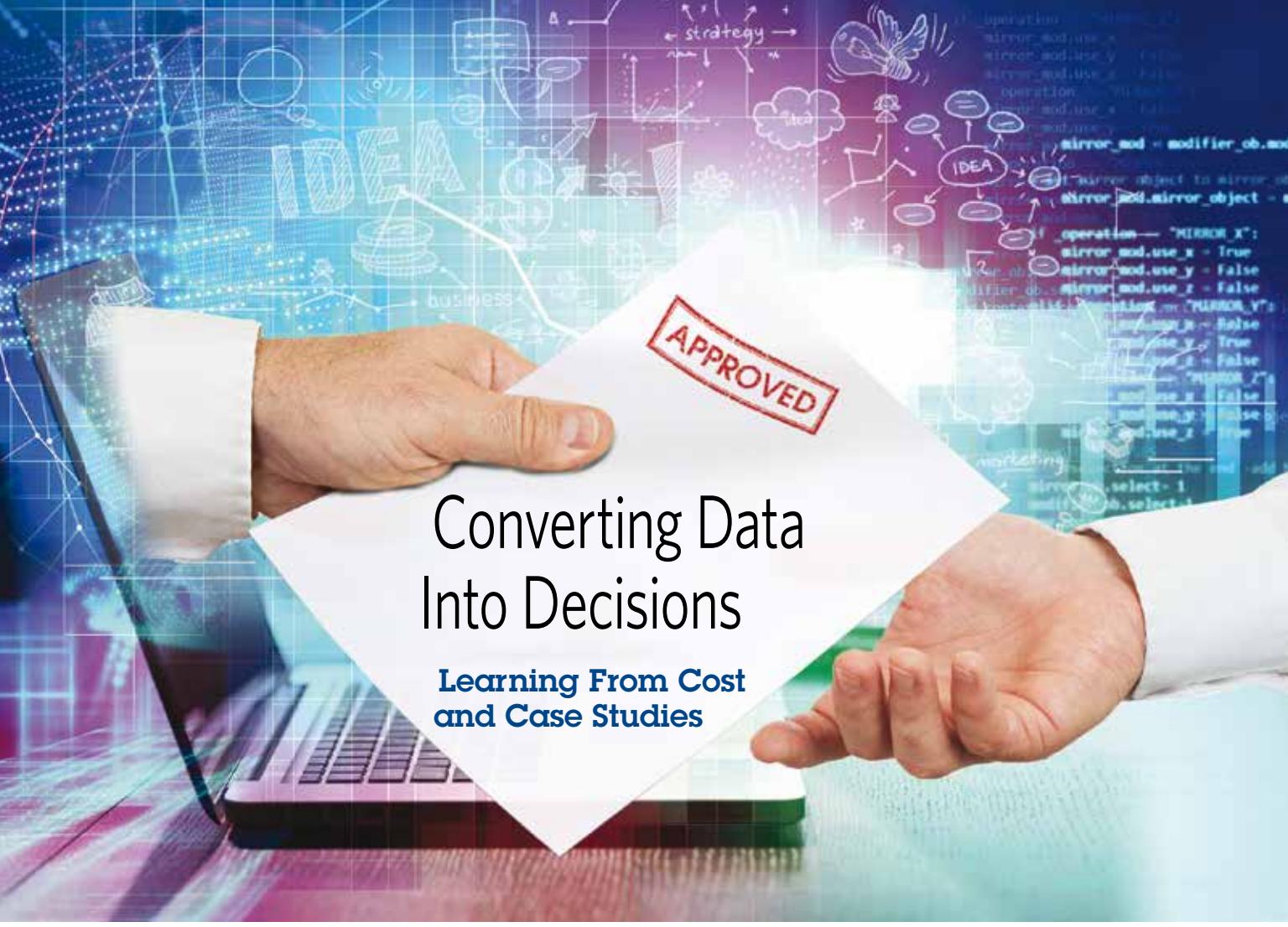
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Converting Data Into Decisions

**Learning From Cost
and Case Studies**

Jennifer Miller, D.B.A.

Have you ever devoted a second to reflect on some newly acquired knowledge that connected somehow to existing knowledge? Not long ago I was working on a doctorate using a case study research design, so when I set out to complete some continuous learning courses for those precious points required by the acquisition and financial management career fields, I tended to pay more attention to those that had qualitative rather than quantitative content.

More recently, I was appointed to lead a Tiger Team effort to determine best value luncheon venue options for a professional association. In this Tiger Team scenario, I blended both quantitative and qualitative research attributes for a comparative multi-case study. In these instances and others, I have been consistently reminded of the lessons

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learned through cost and case studies. My goal is to share a few in this article.

I made a connection between cost management analyses and case studies, a connection facilitated by completing a qualitative research course for my doctorate and a Defense Acquisition University (DAU) course: Cost Risk Analysis Introduction (CLB 024). The connection concerned the critical importance of communication about cost, risk and other data derived from studies. It is rare for data to be left for readers to interpret on their own. Ask most resource managers about what communicating cost, risk and data derived after thorough study means to a wide range of audiences, and the answer is: A real challenge.

To alleviate the challenge, producers like you and me provide aids to communicate the actual meanings and intended take-aways from the data. Perhaps we want to inform, persuade or entertain an audience. Data is the puppet, and our prose the pulled strings. Examples of said aids include executive summaries, management discussion and analysis, bottom-line-up-front (BLUF) statements, and an increasingly popular trend of citizen-centric reporting (CCRs). The latter, CCRs, began about a decade ago with the intent of providing constituents clear, concise understanding of tax dollar spending according to the Association of Government Accountants. I highly recommend reviewing several CCR examples located here (<https://www.agacgfm.org/Resources/Performance-Accountability/CCR/Completed-CCRs/Government-entity-CCRs.aspx>) for inspiration and incorporation in your future communication aids. Communication about cost, risk and other data derived from studies is just one challenge for many career fields. In my doctoral study, I discovered another challenge.

It often is difficult to impart the meaning to a wide range of audiences because—once the learning curve of calculations, correct procedures and numerous types of costs are overcome—individuals for various reasons lack the skillsets to convey the material to people who can take action and make use of the data-derived-information. I know I speak for more than myself when I discover something new with Microsoft Excel or PowerPoint and instantly consider the opportunities I missed to share information had I only known the trick sooner.

Too often I have heard resource managers and “numbers people” cite as their reason for joining the accounting, budget and financial management career fields a desire to avoid the path of prose and those other career options that require strong written and verbal communication skills. However, if you analyze the USAjobs.gov series of Accounting, Budget, and Finance positions, the demand for strong communicators in the series remains strong. Simply look at the Office of Personnel Management (OPM) website for the finer details of what is considered in filling those positions at minimally qualified levels and at particular grade ranges. In scouring the USAjobs.gov site, it is difficult to find Accounting-, Budget-,

and Finance-categorized positions that do not explicitly state that the ability to communicate is a prerequisite or rating measure for applicants.

The following is a verbatim knowledge, skill and ability (KSA) item from the qualifications section for a Financial Management Specialist position: “Ability to communicate clearly and effectively, both orally and in writing.” An Accountant vacancy announcement provided the following as prerequisite experience applicants must have acquired: “Communicate both orally and in writing with a wide variety of customers or stakeholders including the Office of Inspector General (OIG) and/or U.S. Government Accountability Office (GAO) regarding complex accounting/financial issues.” Finally, a Budget Analysis advertisement listed these KSAs among others: “Skill in gathering, assembling, and analyzing source of factual information, such as that found in accounting reports, payroll records, work reports, or inventory and supply data.” Then, “Skill in preparing written forms, schedules, and reports related to the obligation and expenditures of funds.” As this indicates, communication skills are vital. With each internal or external investigative report of the Department of Defense (DoD) spending and costs, the ability of employees to accurately, briefly and concisely (ABC) justify our finances remains a solid requirement.

In studying both the qualitative and quantitative research methodologies and even mixed methods research in addition to the handful of research designs encompassed by them, I have found that there is a range of options adaptable to suit those who have good writing skills as well as those at the kiddy end of the prose pool. For example, well-known case study research author Robert K. Yin, the author of the bestselling text “Case Study Research, Design and Methods” (2009, SAGE Publications), provided categories of potential case study audiences an author might consider using in order to meet the needs of specific audiences. Report content prepared for a policy maker would certainly differ from that presented to a subject-matter expert (SME) while the author still conveys the same core information.

Report formats may be single- or multiple-case studies; a question-and-answer format applicable to single- and multiple-case studies; and a multiple-case study-only option to abandon chapters or sections to the report so that a cross-case analysis is available for audiences, according to Yin. I have had the opportunity to successfully utilize a few of these report formats with slight modifications, as I imagine most of us have. In my opinion, the last option would be daring and may seem like a half-baked Analysis of Alternatives (AoA), course of action analysis (COAA), business case analysis (BCA), cost-benefit analysis (CBA), or other tangible or intangible cost-oriented analysis. Of course, that option may be the best fit for the communicator and intended audience. A range of other options exists too in this modern day of “do more with less.” It is always wise to put yourself in the shoes of an audience member and be sensitive to details and any preferences you

In scouring the USAjobs.gov site, it is difficult to find Accounting-, Budget-, and Finance-categorized positions that do not explicitly state that the ability to communicate is a prerequisite or rating measure for applicants.

have observed from prior work. That is, it is good to be conscious and accommodating about time constraints in order to digest the content shared and be aware of any color blindness and preferences of the means of delivery (poster board display, Word document paper, audio embedded PowerPoint, quad chart, 60-second elevator speech, etc.). I also encourage obtaining feedback: Communication is a two-way street.

From DAU's Cost Risk Analysis Introduction course, I took the continuing education opportunity to refresh myself with those intangible and difficult to quantitatively study costs of risk. Hence, my connection and "Aha!" moment about qualitative research and case studies.

After all, if we cannot assign a quick, comparative number to something, then the second-best option is to provide a text description giving merit to some otherwise subjectively determined element(s). Examples of this include using the measures of merit (MoM) matrixes, risk matrixes for acquisition programs seeking a materiel development decision (MDD) and even in our daily decisions where all else that is quantitative becomes comparatively equal or very close to equal so that subjective attributes influence our decisions. Qualitative research favors the phrase "rich, thick descriptions" as would readily be agreed by Yin and other research authors like John W. Creswell (author of "Quantitative Inquiry and Research Design," 2007, SAGE Publications). In the recent comparative case study I conducted for best-value luncheon venues, the quantitative data were easy—profit and loss, location distance, price of audio/visual aid, etc. These were objective data points. However, the qualitative data of buffet or plated style food service, type of cuisine, past experiences with venues, privacy of venue, and salesmanship were less easy to compare and contrast, making it more suitable for multiple individuals to discuss and assess the choices based on merit. Ultimately, the Luncheon Tiger Team compiled a report including decision support for a group vote rather than a decision.

With the DAU foundational course, one learns about the relationship of risk management to cost estimation for the benefit of program costs, schedule and performance. Many calculations of tripwires, thresholds, objectives and data points can be contrived using DAU's gold and platinum cards for the cost analyst or estimator who is close to the data, but the data handler is in the minority.

The audiences of risk management are very broad compared to those for cost management, and most of them are very demanding. This might include agency leadership, procurement personnel, executive office members, program management office staff, and the various groups and teams of Defense Secretary-level positions. Some audiences are subject to greater scrutiny than others, and some audiences' environments have higher operations tempo than others. In consideration of the audiences, continued market research and monitoring for any pertinent changes of the data or sensitive variables is important as both are continuous processes leveraged to help provide the best decision support, or perhaps best value for an organization procuring a good, service or, in my recent experience, a luncheon venue. As previously conveyed, best value may be defined by some quantitative and qualitative elements: price, cost, schedule, performance and risk surrounding procurement of goods and/or services. Again, this is a reminder of the power behind your pen and presentation to communicate that which cannot be imparted simply displaying numerical data on a projection screen. Developing the calculations, following correct procedures, and understanding the case studies of cost is one thing, but the data must be converted to actionable information. This might be an ABC version of one case study format or another to address a widespread audience.

Now may be a great time to create a New Year's resolution to enhance our cost management analysis and case study skills. Continuous learning courses, formal education, and self-guided research are all feasible options to gain and sharpen skills as shared in my continuous learning and doctorate connection as well as a recent study of luncheon venues. There is no doubt those skills will serve you and the DoD well. The communication connection is apparent in the cost struggles that many will experience as our budgets continue declining amid a continuing need to defend defense dollars. Cost and case studies are not reserved strictly for "green eyeshade-wearing bean counter" personnel; all other career fields facing challenges with risk, quantifying subjective attributes and communicating studies should consider sharpening cost management analysis and case study skills.

If you have learned a lesson or two from this article, try applying it to your next cost and/or case study. And good luck! &

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New System to Manage Nurses' Workloads

Optimizing Patient Care at Walter Reed

Jason J. Cunningham





Walter Reed National Military Medical Center, the nation's largest military treatment facility, faced a major challenge maintaining its reputation for excellence: how to modernize the aging system used to manage hours for a nursing staff of more than 7,000 without adversely affecting patient care for more than 1 million beneficiaries each year.

The Clinical Support Program Management Office (PMO) and the former Customer Deployment Support Branch within the Solution Delivery Division (SDD) of the Defense Health Agency (DHA) answered the challenge with its May 22 release of the latest version of the Workload Management System for Nursing-internet (WMSNi)—WMSNi 2.0.

WMSNi 2.0 is a Web-based Patient Classification System (PCS) used to capture the number of nursing care hours needed by different patients, to facilitate the distribution of available nurses among the patients. Knowing how many hours of care each patient requires is essential to managing each nurse's workload. WMSNi 2.0 automates and simplifies the paper and manual data entry process still used at many military hospitals and clinics.

Background and Early Development

In 1955, Esther Claussen conducted the first patient classification study at Walter Reed. Her work produced the report "Nine Category Scale of Patient Needs." Modifications were made over the years until 1985 when the U.S. Army Nurse Corps and U.S. Navy Nurse Corps joined forces to develop the first paper-based iteration of WMSNi.

Over time, the critical indicators that formed the backbone of the system no longer reflected current practices. Changes in inpatient practices, technology and new regulations required a thorough review and revalidation of the nursing care hours associated with each indicator.

An Army research team was assembled to look at each of the 99 critical indicators at 26 military treatment facilities across the country. The team performed a series of time and motion studies for each nursing activity. According to one report in the *U.S. Army Medical Department Journal*, these observations were made on 60 different nursing duties and generated more than 3,200 time measurements. The data formed the foundation of the

Cunningham is a member of the Stakeholder Engagement Branch of the Defense Health Agency's Solution Delivery Division. He covers advancements in health technology solutions at military treatment centers worldwide.

The WMSNi team trained: 544 staff members 89 super users 451 end users

next few generations of PCSs. "Second generation systems were designed to focus on patient care," Kelle Harper and Crystal McCully explained in their December 2007 article in the *Nursing Administration Quarterly*, "Acuity Systems Dialogue and Patient Classification System Essentials."

"By the 1990s, third generation PCSs were critical due to shorter hospital stays and less stationary staff," Harper and McCully reported. "Fourth generation systems now focus on prospective modeling, evolving to provide real-time matching of caregiver skill profiles to meet staffing needs for the current and upcoming shifts."

WMSNi 2.0 is the latest advance in the progression.

Patient Classification Systems and WMSNi

Two types of workload management systems commonly are used in the nursing field: the summative task type and the critical incident or criterion type.

Harper and McCully explained that summative task PCSs "usually appear comprehensive because they list major tasks and tend to be easier to design and code to an interface." However, they also noted that the criterion type can be more easily adapted to the organization.

Both systems provide similar benefits to users, including data-driven decision making, standardized documentation and—most crucially—integration with existing staff scheduling systems.

The WMSNi 2.0 is a summative task PCS that presents a patient's care requirements in terms of the frequency of tasks. WMSNi 2.0 is the latest, fourth-generation version of the unintuitive legacy WMSNi system that has been in use at many military treatment facilities for years.

The Need to Update

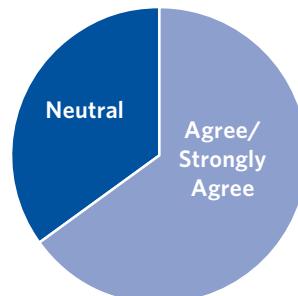
Walter Reed Nurse Informatics Officer Army Maj. Angel Howell said the treatment facility was still using a paper-based, manual data entry system before implementing WMSNi 2.0. She called the process time consuming and prone to data entry errors and explained that Walter Reed "used the old DD2551 worksheet to capture nursing care hours and determine the acuity of each inpatient. This data was then manually entered into a database to determine the appropriate staff mix."

In a 2011 U.S. Army Medical Department Center and School survey of 105 nurses, 66 percent of respondents agreed or strongly agreed that the legacy WMSNi was not optimal and

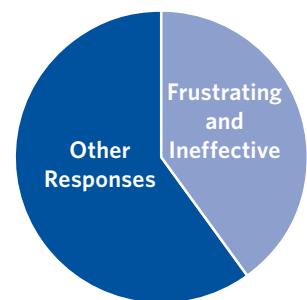
Figure 1. A Tale of Two Systems

Pre-Implementation Survey of the Legacy WMSN System

The legacy WMSN is not optimal and does not meet our needs.



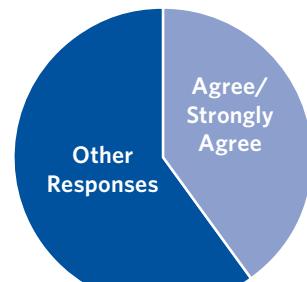
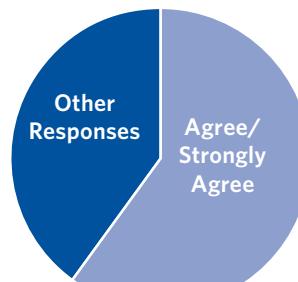
How easy is it to use the legacy WMSN system?



Post-Implementation Survey of the WSMNI 2.0 System

WMSNi provides an effective way to document the inpatient clinical workload data.

WMSNi is easier to use and meets my needs.



The photographs and figures were produced by the Defense Health Agency's Solution Delivery Division.



Above and right: Staff at Walter Reed work with the new internet nursing workload management system.



did not meet their needs. Forty-three percent rated it as frustrating and ineffective.

At Walter Reed, the system was ripe for a major upgrade. "We went from a paper process to WMSNi 2.0, skipping WMSNi 1.0," Howell said. She noted that early WMSNi versions could not compare staffing needs at Walter Reed with those at other facilities, a feature they felt necessary.

"The greatest benefit of WMSNi 2.0 will be the ability to benchmark against other military treatment facilities with similar services/size," Walter Reed Nurse Informaticist Segin Hunt added. "We are looking forward to an improved ability to trend and predict staffing needs with more reliable data."

Lt. Cmdr. Stephen Dunham, who works in the Walter Reed Nursing Administration Business Cell, said he was often frustrated by an inability to compare or share data. "The greatest limitation of the before-state was that none of the data was formally recognized by DHA, AMEDD [Army Medical Department] or NAVMED [Navy Medical Department], so we could only use it as a local tool," he said. "Now that we are using the same system as every other Army medical treatment facility,

...The balance of great leadership and vision, along with the team effort by the WMSNi representatives, including the data base and system administrators and the organized team members in charge of meeting notes and scheduling, created a cohesive group prepared to work hard to make the deployment process run smoothly.

we are on a level playing field. As the data mature, we can begin using it to better inform decisions."

WMSNi 2.0 allows staffing managers to directly compare the staff they have scheduled against the staff the facility will need based on the required nursing care hours specified in the patient classification system. Managers can then reallocate staff and eliminate over- or understaffed units. Walter Reed's leaders believe this tool will improve facility staffing projections, ensure staffing needs are met, and simultaneously document and analyze nursing workload, thereby improving patient safety.

Smooth Deployment at Walter Reed

The successful WMSNi 2.0 deployment in May was the culmination of more than 9 months of work by the Clinical Support PMO. In November 2016, the team began preparing for the transition. Clinical Support deputy program manager Yvonne Hobson and Customer Deployment Support PMO liaison and deployment operations chief Barbara Grossman and their respective teams held regular meetings to determine the pre-deployment checklist and the requirements needed to prepare the site to go-live with WMSNi 2.0. Starting 120 days from the launch date, the team met once a month to track the progress, risks and issues while working with Walter Reed to finalize all requirements and complete training for 544 staff members, 89 super users and 451 end users.

To ensure Walter Reed's successful transition to the new system, the SDD WMSNi team did not treat the go-live date as a finish line. Instead, after the launch the level of communication was increased with the facility's staff to ensure that the system worked as expected. After the system was online for a month, the team began a series of post-implementation meetings with the site staff to review their checklist and communicate post-deployment progress with the facility. Collaboration between the SDD team and Walter Reed staff was critical to the seamless transition.

"The [Walter Reed] staff was supportive, willing and in constant communication with the WMSNi team," Grossman said. "They were responsive, happy, and willing to make it work." Project manager Ken Ross agreed, saying he believes that, if not for the team, nothing would have been completed. He said the balance of great leadership and vision, along with the team

effort by the WMSNi representatives, including the data base and system administrators and the organized team members in charge of meeting notes and scheduling, created a cohesive group prepared to work hard to make the deployment process run smoothly.

Impact After Implementation

To date, approximately 30 percent of the units are producing reliable data that could be used to determine the long-term impacts of the WMSNi 2.0 upgrade at Walter Reed National Military Medical Center.

"It is too early to assess the impact of the WMSNi 2.0 solution," Hunt said. "It is difficult to do a pre- and post-analysis since the paper system does not use the same calculations as the computerized tool."

The prospects look good for Walter Reed's patients. A 2003 multisite study by Dr. Sung-Hyun Cho in partnership with the Agency for Healthcare Research and Quality found that an increase of 1 hour worked by registered nurses per patient day correlated with an 8.9 percent decrease in the odds of pneumonia among surgical patients. Improved accuracy in scheduling clearly can have a direct impact on patient care. WMSNi 2.0 also features special patient codes to account for the workload required by ambulatory and outpatient visitors. Howell anticipates significant benefits in forecasting staffing needs, which was difficult to do under the old system.

"WMSNi 2.0 is a prospective system," she explained. "Thus we are optimistic that the deployment of WMSNi 2.0 will increase the accuracy in estimating workload and predicting daily, monthly and annual staffing needs. We also hope to streamline staffing requirements by comparing our nursing care hour requirements to other DHA facilities."

As treatment facilities and program management offices throughout the Military Health Services look to harness the power of data in decision making, WMSNi 2.0 should provide both the reflective and predictive analytics needed to ensure staffing levels and staff expertise provide the best possible care to our Service members and their families.



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Riding the Crest of the Data Revolution

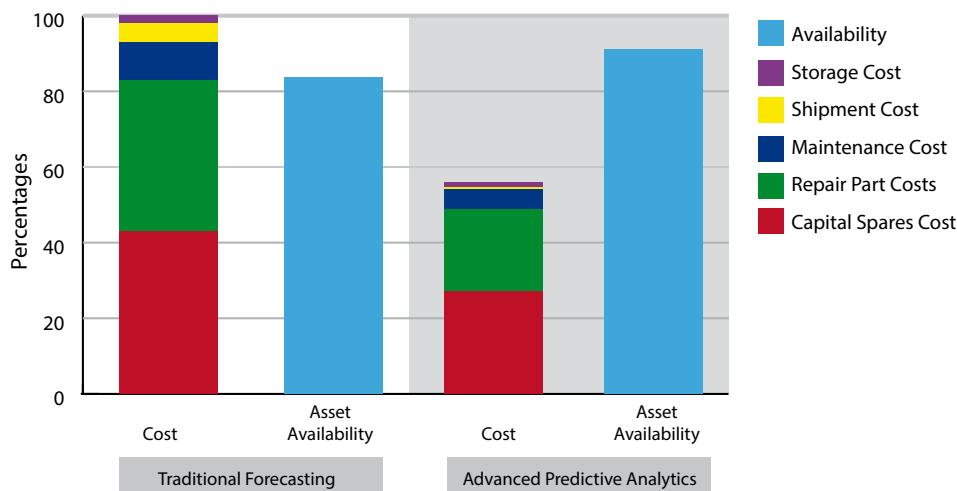
C. D. Moore

Early every facet of our lives has been impacted by an exploding level of digital connectivity with corresponding rivers of data touching all aspects of society.

Whether we like it or not, a revolution is under way in the science of data collection and analysis with direct implications for all parts of our day-to-day existence ... with both positive and negative effects. Today we live with mounting challenges associated with this data revolution and the digital transformation, from ransomware and identify theft to privacy issues. On the other hand, the advancements are driving increased connectivity, improved productivity and greater efficiencies in our personal lives as well as business activities.

Moore, a retired U.S. Air Force (USAF) lieutenant general, began his military career as a fighter pilot and experimental test pilot for many aircraft types, including the F-22 fighter jet. He later served as an acquisition leader and guided the Defense Department's premier fighter programs—the F-16, F-22 and the F-35. Prior to retiring, he led the USAF Life Cycle Management Center, a 26,000-member organization supporting more than 3,000 programs. He currently serves on several corporate boards, including Clockwork Solutions LLC, a predictive analytics company in Austin, Texas.

Figure 1. Experiential Asset Life-Cycle Support Costs and Availability



Figures produced in coordination with Clockwork Solutions of Austin, Texas.

The rapid growth of social media and global communications are clear examples of this digital transformation. Companies are harnessing large amounts of data and employing ever-more-sophisticated data analytics to tailor products and services for a worldwide customer base. Companies are compiling and studying data to more efficiently meet the needs of a diverse, mobile and digitally connected population. Almost all industries are changing to keep pace with this data revolution—from transportation and communication to recreation and entertainment.

One of the more exciting and impactful areas associated with this data revolution involves system logistics, specifically the ability to collect and analyze large amounts data to dramatically improve system performance—increasing system availability while lowering operating costs. Just imagine operating a system—a car, an aircraft or an expensive piece of industrial equipment—and rarely dealing with unplanned breakdowns because of the ability to integrate multiple sources of data to accurately forecast component problems before they result in failure.

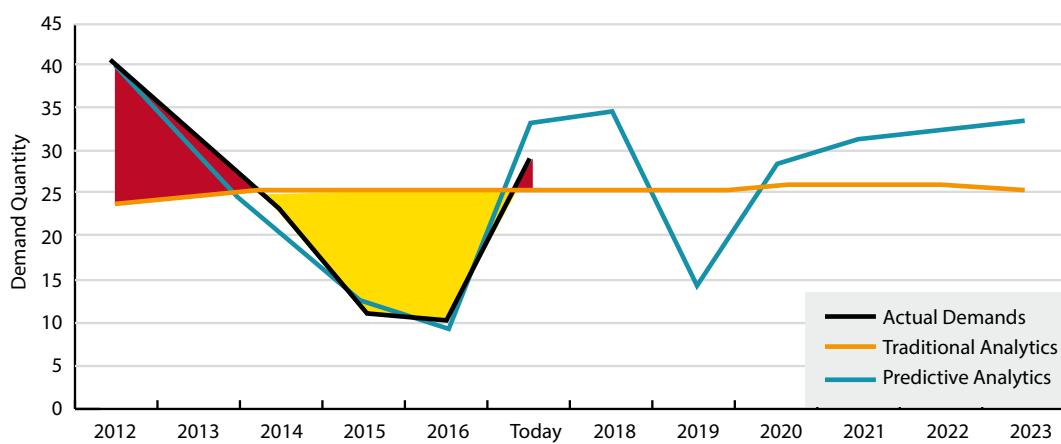
Large numbers of disparate data sources can now be compiled, correlated and analyzed in order to more accurately predict system performance. The science of predictive analytics has advanced to the stage where unexpected system main-

tenance and costly downtimes, parts delays or unnecessary and inefficient supply stocks can be largely eliminated. This translates into significant business efficiencies and cost savings that are good for the producer and the customer. Everyone benefits from this transformation. The ability to collect and analyze large amounts of data is changing how organizations develop competitive advantages in the delivery of products and services. One of the most impactful and exciting outcomes of this data revolution and application of advanced predictive analytics involves the national defense enterprise.

The Department of Defense (DoD) spends billions of dollars every year sustaining weapon systems, and those expenditures increase as weapon systems age. By harnessing the power of advanced predictive analytics, and pursuing condition-based maintenance (CBM), the DoD is well positioned to dramatically improve system availability while slashing sustainment costs. The advancement in predictive analytics is at the point where maintenance concepts for military weapon systems can move from schedule-driven and costly preventive procedures to more efficient data-informed and CBM activities accompanied by more accurately forecasted parts requirements. These are the benefits of CBM—a more cost-effective approach for managing fleets of systems supported by rapid improvements in the science of data management and predictive analytics.

The linkage between predictive analytics and CBM has direct application on fleet management—whether of aircraft, ground

Figure 2. Component Historical and Predictive Demand Comparison



vehicles, or support systems—where large amounts of data can be compiled and analyzed to accurately predict system performance. Money saved from employing smart predictive analytics on fleets of systems can be used to modernize and recapitalize the force structure. This is good for the military establishment and good for the taxpayer.

The world is undergoing a digital transformation, and the DoD has an opportunity to be the leader in the application of predictive analytics to change how fleets of systems are sustained. The potential for saving billions of dollars while simultaneously increasing system availability and warfighting readiness is well beyond the theoretical stage. The first step in this process is determining that the time is right to transform; the logical next step is partnering with the right product and service provider with a proven track record in the application of advanced predictive analytics. If done correctly, the results will speak loud and clear.

What does this transformation look like at the tactical level? Before a component fails, suspect parts are procured with the appropriate lead time to support the preplanned removal and replacement; and, if a part does fail, the supply system has been accurately primed using a more effective reliability forecasting capability. For those responsible for fleet management, employing these advanced prediction capabilities and forecasting tools provides the means to completely alter the supply and repair processes. No longer are managers and logisticians tied to inherently inaccurate and inefficient historical extrapolations for determining repair and parts requirements. In this enhanced forecasting process, system downtime is significantly reduced, savings accrue from a more accurate and timely parts procurement, and, most important of all for the DoD's combatant commanders, system availability and readiness increase dramatically.

When companies and government organizations embrace this data revolution and capitalize on the latest predictive analytics capabilities, the results will produce a stark contrast from the past. However, those who remain trapped in using historical forecasting methods soon will realize that the old sustainment model is no longer affordable nor competitive. The data revolution is here and it is dramatically changing how we live, think and operate. The logistics paradigm is changing, and those who capitalize on the most advanced predictive analytics tools will become the industry leaders.

The old adage has it that one must lead, follow or get out of the way. There are opportunities today for organizations to lead in the data revolution by embracing new predictive analytic capabilities and driving more cost-effective ways of doing business. Those who do so will be the competitive winners in this transformational, data-rich era; others will be left behind. It is past time to employ the full power of advanced data analytics. &

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Sun Tzu and the Art of Cyberwar

Roy Wilson

Sun Tzu is widely recognized as the premier military strategist in the history of the world. His book "The Art of War" was written approximately 2,500 years ago in China but its strategic and tactical information remains widely recognized as valid for modern warfighters. It has influenced the strategic and tactical thinking of military leaders such as America's Gen. Douglas MacArthur, China's Mao Zedong and Vietnam's Gen. Vo Nguyen Giap.

Modern warfare historically has been conducted in four domains; land, sea, air and space. In 2016, NATO accepted the cyber domain as a fifth domain for warfare. The decision is aligned with the U.S. military strategy that already recognized cyberspace as a warfare domain. In 2009 the U.S. Government established the United States Cyber

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Command (USCYBERCOM) to fulfill tasks related to cyber conflicts. Examining Sun Tzu's "The Art of War" in light of the new cyberwarfare domain reveals some very interesting and highly applicable strategies and tactics. "The Art of War" is laid out in 13 chapters with the following chapter titles.

Laying Plans
Waging War
Attack by Stratagem
Tactical Dispositions
Energy
Weak Points and Strong
Maneuvering
Variation in Tactics
The Army on the March

Terrain
The Nine Situations
The Attack by Fire
The Use of Spies

Strategies from each of these 13 chapters are herein examined from the cyberwarfare domain perspective. The Sun Tzu quote is provided in italics in bulleted items, followed by a short analysis of cyberwarfare domain applicability. In the interest of space, the number of strategies examined are limited to a few from each chapter in "The Art of War."

Chapter 1. Laying Plans

■ *The art of war is of vital importance to the state.* It is equally true today that the art of cyberwar is of vital

Use the conquered foe to augment one's own strength.

Sun Tzu apparently understood the concept of a botnet 2,500 years ago.

importance to the state. Defending our national infrastructure and commerce systems is not just vital, but critical to maintaining our citizen's safety. The ability to conduct offensive cyber operations as a means of degrading our enemy's war-fighting capability is of equal importance.

- *Hold out baits to entice the enemy.* Sun Tzu apparently understood the concept of a honeypot 2,500 years ago. A honeypot entices the enemy into a cyber arena where the defender has the initiative.
- *Attack him where he is unprepared.* An unsecured network is the "low hanging fruit" for a cyber warrior.

Chapter 2. Waging War

- *Use the conquered foe to augment one's own strength.* Sun Tzu apparently understood the concept of a botnet 2,500 years ago.
- *There is no instance of a country having benefited from prolonged warfare.* This is an interesting observation and equally true in the cyberwarfare domain. As a cyberwar progresses, it would be wearing on the population to have disruptions in commerce, health care and compromises to personal privacy that would be likely targets in the cyber domain.

Chapter 3. Attack by Stratagem

- *The skillful leader subdues the enemy's troops without any fighting; he captures their cities without laying siege to them; he overthrows their kingdom without lengthy operations in the field.* Warfare in the cyber domain could potentially result in overthrow of the enemy without any physical combat in the other four warfare domains.

- *We may know that there are five essentials for victory:*

- *He will win who knows when to fight and when not to fight.*
- *He will win who knows how to handle both superior and inferior forces.*
- *He will win whose army is animated by the same spirit throughout all its ranks.*
- *He will win who, prepared himself, waits to take the enemy unprepared.*
- *He will win who has military capacity and is not interfered with by the sovereign.*

An argument can be made that each of these essentials apply to the cyber domain. Choosing the cyber battlespace time and location, understanding strengths and weaknesses of our cyber forces and the enemy cyber forces, having the initiative, and free rein from civilian authorities are keys to success.

- *If you know the enemy and know yourself, you need not fear the result of a hundred battles.* Winning in the cyber domain depends on knowing your cyberwarfare capabilities and those of the enemy.

Chapter 4. Tactical Dispositions

- *To secure ourselves against defeat lies in our own hands, but the opportunity of defeating the enemy is provided by the enemy himself.* Cybersecurity needs to be engineered into our systems, both military and civilian. Cybersecurity applies to both networks as well as platforms and control systems. Weakness in enemy systems need to be exploited vulnerabilities in cyberwarfare.
- *To lift an autumn hair is no sign of great strength; to see the sun and moon is no sign of sharp sight; to hear the noise of thunder is no sign of a quick ear.* In our cyberwarfare domain, we need to be more than "script kiddies" on defense and offense.

- *The skillful fighter puts himself into a position which makes defeat impossible, and does not miss the moment for defeating the enemy.* In cybersecurity, our systems need to be resilient that they cannot be defeated. Our cybersecurity defensive observe, orient, decide and act (OODA) loop must react to and defeat any cyberattack.

Chapter 5. Energy

- *The impact of your army may be like a grindstone dashed against an egg—this is effected by the science of weak points and strong.* Analysis of software or hardware weaknesses, vulnerabilities, pivot points and attack surface will support the identification of weak points and strong points.
- *Energy may be likened to the bending of a crossbow; decision, to the releasing of a trigger.* A Trojan implanted in a system has potential energy that is released when the trigger command conditions are satisfied.

■ Energy amid the turmoil and tumult of battle, there may be seeming disorder and yet no real disorder at all. Disorder and chaos may be the intended desire of a cyberattack on a nation's infrastructure. However, the perceived disorder and chaos is a result of the orderly commands executed by a cyber attacker—and, hence, no disorder at all.

Chapter 6. Weak Points and Strong

■ The clever combatant imposes his will on the enemy, but does not allow the enemy's will to be imposed on him. Warfare in the cyber domain requires both an offensive and defensive capability.

■ A general is skillful in attack whose opponent does not know what to defend; and he is skillful in defense whose opponent does not know what to attack. A cyberattack surface can provide multiple entry points into a system that the attacker can use to enter and then pivot to critical subsystems. Keeping knowledge of our weaknesses from our enemy will reduce the likelihood of a successful attack.

■ O divine art of subtlety and secrecy! Through you we learn to be invisible, through you inaudible; and hence we can hold the enemy's fate in our hands. This cuts to the heart of cyberwarfare principles. A successful advanced persistent threat (APT) is subtly and secretly entered into the target system or a Trojan is likewise introduced. From that point on the system is owned ("Pwned") by us, and its fate is in our hands.

■ Do not repeat the tactics which have gained you one victory, but let your methods be regulated by the infinite variety of circumstances. Our offensive tactics in the cyber domain must continually evolve. What worked in one engagement will very probably not work in the next unless we stay inside of the defenders OODA loop. Conversely, our cyber defenses must be threat agnostic and behavioral based. Beat the abnormal behavior and you've defeated the threat regardless of the tactics evolution. This also is associated with Sun Tzu's following precept:

■ He who can modify his tactics in relation to his opponent and thereby succeed in winning, may be called a heaven-born captain.

Chapter 7. Maneuvering

■ Let your plans be dark and impenetrable as night, and when you move, fall like a thunderbolt. Maneuver in the cyber domain must be kept secret and when the trigger is pulled, the cyberattack must be designed to effectively accomplish the mission.

■ Ponder and deliberate before you make a move. This is equally true and maybe more so in the cyber domain. Cyberattacks may result in retaliatory attacks that the aggressor is unprepared to respond to or may even lead to traditional warfare in the other domains.

Chapter 8. Variation in Tactics

■ In the wise leader's plans, considerations of advantage and of disadvantage will be blended together. Strategic and tactical trade

space in the cyber domain needs to be understood prior to any engagement. We will always hold some advantages but will also have a disadvantage somewhere.

■ Reduce the hostile chiefs by inflicting damage on them; and make trouble for them, and keep them constantly engaged; hold out specious allurements, and make them rush to any given point. Modern cyberattacks that take down Internet connectivity, disable communications, or disrupt power generation systems would be very appealing to Sun Tzu.

■ The art of war teaches us to rely not on the likelihood of the enemy's not coming, but on our own readiness to receive him; not on the chance of his not attacking, but rather on the fact that we have made our position unassailable. In the cyber domain of warfare, it is inevitable that we will be attacked. In fact, both our civilian and military information technology (IT) systems have been and are being subject to cyberattacks. This is the rationale behind the new System Survivability Key Performance Parameter that says in part that all new systems need to be designed to survive in a cyber contested environment. We need to design our systems to deter, detect and recover from any cyberattack.

Chapter 9. The Army on the March

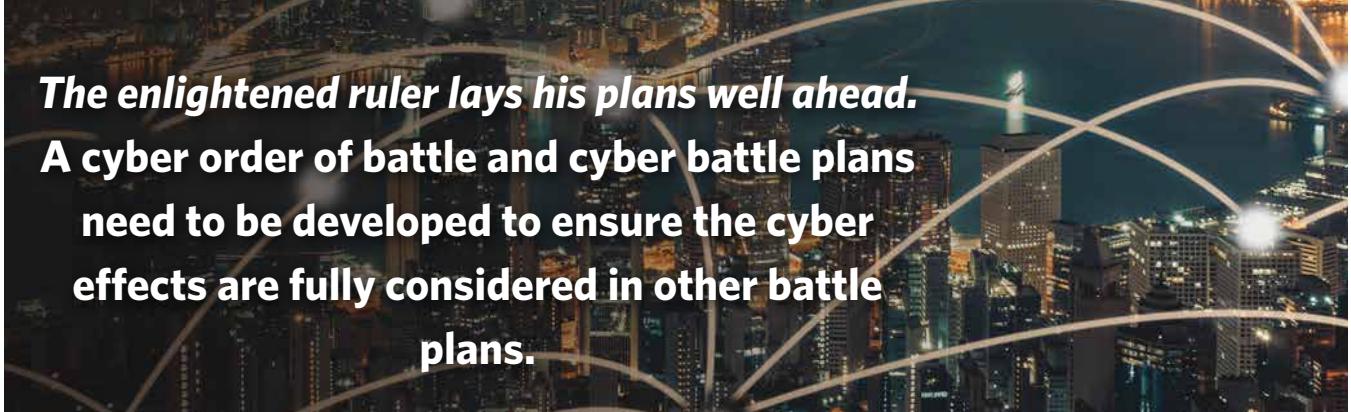
■ Pass quickly over mountains, and keep in the neighborhood of valleys. Concealing one's activities to avoid discovery by the enemy is a central tenet of any good cyberattack. Being able to enter a system undetected and move laterally within a system to reach the objective is essential to success.

■ If in the neighborhood of your camp there should be any hilly country, ponds surrounded by aquatic grass, hollow basins filled with reeds, or woods with thick undergrowth, they must be carefully routed out and searched; for these are places where men in ambush or insidious spies are likely to be lurking. This saying of Sun Tzu speaks to the design and architecture of our IT systems. We need to employ software assurance practices in design/implementation and security architectures that give our adversary no place to hide malware.

Chapter 10. Terrain

■ With regard to ground of this nature [accessible], be before the enemy in occupying the raised and sunny spots, and carefully guard your line of supplies. Several studies have shown that our cyber supply lines are very vulnerable. Department of Defense Instruction (DoDI) 5200.44, Trusted Systems and Networks, lays out some countermeasures to address the supply chain concern. It is essential that the military Services develop supply chain risk countermeasures and document them in classified appendices in program acquisition documentation such as the Life Cycle Support Plan and the Program Protection Plan.

■ If you know the enemy and know yourself, your victory will not stand in doubt. The first phase in the anatomy of a cyberattack is reconnaissance. The importance of good reconnaissance was made abundantly clear in the StuxNet virus attack on the Iranian nuclear fuel enrichment facility. Specific hardware in



The enlightened ruler lays his plans well ahead.

A cyber order of battle and cyber battle plans need to be developed to ensure the cyber effects are fully considered in other battle plans.

the facility was subject to the attack and that could not have been accomplished if necessary intelligence wasn't gathered well during the reconnaissance phase.

Chapter 11. The Nine Situations

■ Those who were called skillful leaders of old knew how to drive a wedge between the enemy's front and rear; to prevent co-operation between his large and small divisions. Skillful leaders in the cyber domain will drive a cyber wedge between the enemy's front and rear; to prevent co-operation between divisions. DoDI 8510.01, Cybersecurity, recognizes the importance of information communication on the modern battlefield and structures the DoD cybersecurity around protection of the information. Our modern systems are ever more reliant on participation in the DoD Information Network (DODIN) for success on the battlefield. In fact, it has been stated, the "If you are not on the net, you are a target."

■ Rapidity is the essence of war: take advantage of the enemy's unreadiness, make your way by unexpected routes, and attack unguarded spots. Our successful cyberattack will enter via unguarded or weakly guarded spots. Conversely, we need to examine the cyberattack surface for our systems to ensure we leave no entry point unguarded. The unguarded spot is where the adversary will launch their exploit.

■ The skillful tactician may be likened to the shuai-jan. Now the shuai-jan is a snake that is found in the Ch`ang Mountains. Strike at its head, and you will be attacked by its tail; strike at its tail, and you will be attacked by its head; strike at its middle, and you will be attacked by head and tail both. Our cyber defensive countermeasures must be modeled after the shuai-jan. Behavioral monitoring tools that provide for active countermeasures need to be developed to ensure system resiliency in the face of a cyberattack. Cyber domain defense tactics are still in their infancy relative to the other domains of warfare. "The Art of War" had a significant influence on the works of U.S. Air Force Col. John Boyd (1927-1997), arguably the best military strategist to work in the field since Sun Tzu. Boyd advanced tactics in the domain of air warfare following World War II, and cyber warriors need to do the same in their warfighting domain before a major conflict in the cyber domain breaks out.

■ Forestall your opponent by seizing what he holds dear. Likewise in the cyber domain! For our systems, we need to conduct a Cyber Failure Modes Effects and Criticality Analysis (Cyber

FMECA) to determine what is critical and crucial to defend from cyberattack. In risk management terminology, these must-defend areas are those that score the high mark of 5 on the consequence (or impact) axis of the risk matrix. In an aviation system, this may be the flight control algorithms, or in a defense business system this may be the personal identification information of active-duty Service members.

Chapter 12. The Attack by Fire

■ The enlightened ruler lays his plans well ahead. A cyber order of battle and cyber battle plans need to be developed to ensure the cyber effects are fully considered in other battle plans. Likewise, we need to expect cyberattack plans to have been developed by our adversaries and build cyber effects into our campaign models.

■ No ruler should put troops into the field merely to gratify his own spleen; no general should fight a battle simply out of pique. Warfare in the cyber domain must be carefully considered. Hasty action in the cyber domain may result in retaliatory action in either the cyber or any of the other four warfare domains. An act of war is an act of war.

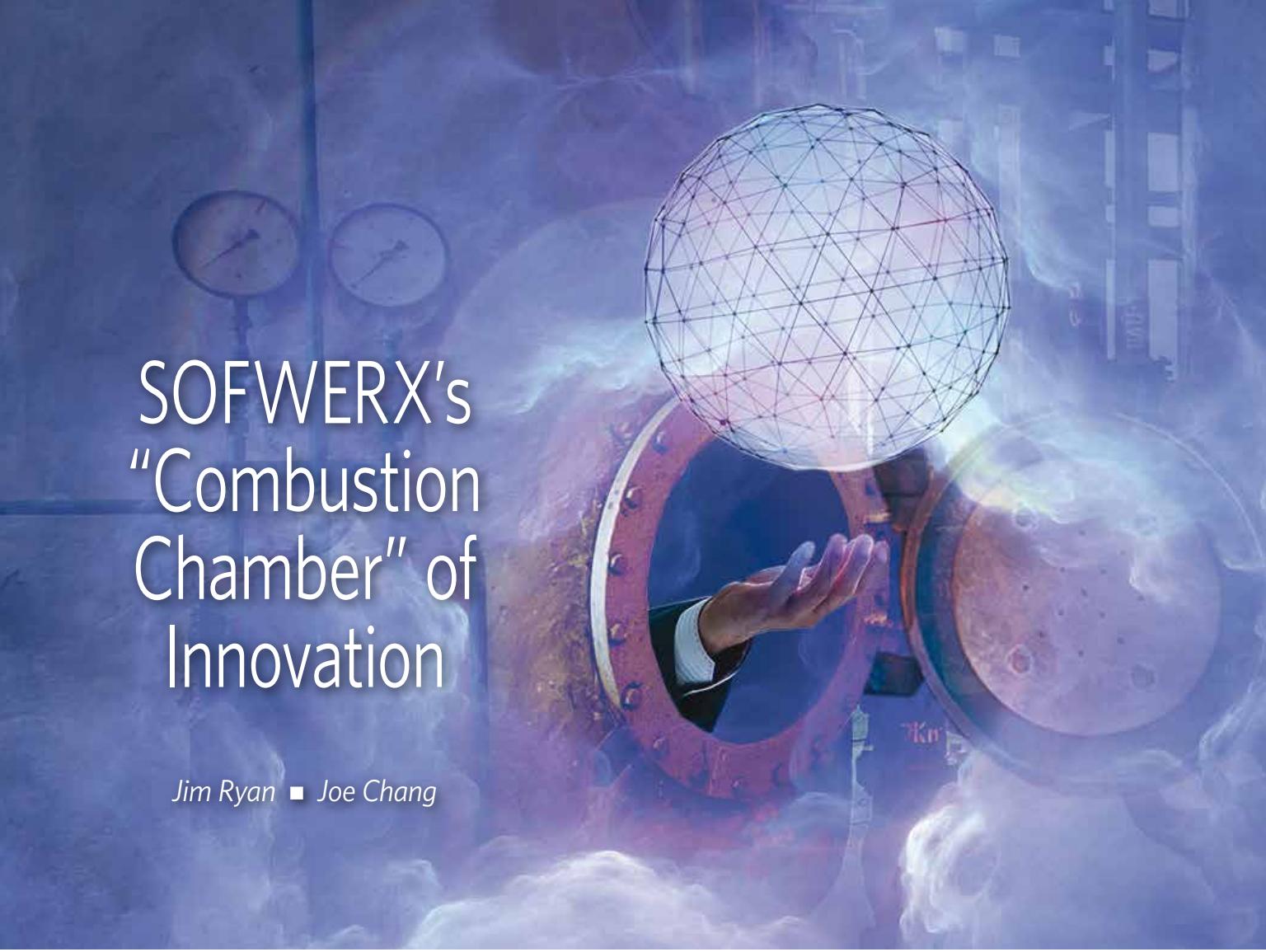
Chapter 13. The Use of Spies

■ What enables the wise sovereign and the good general to strike and conquer, and achieve things beyond the reach of ordinary men, is foreknowledge. The cyber domain throughout history has been an essential element in gathering intelligence. Cryptographic algorithms, such as the Julian cypher, have been in use for centuries providing information protection. Likewise, the breaking of cryptographic algorithms to discover information has been a key to decisive victories. As proof, I refer the reader to the victory secured by U.S. forces at the battle of Midway only 6 months after the devastating Japanese attack on the U.S. Navy at Pearl Harbor in World War II.

■ Be subtle! Be subtle! And use your spies for every kind of business. The best advanced persistent threat is subtle and undetected in execution of its mission. Our adversaries do not limit their cyber espionage to the business of the DoD. They infiltrate the defense industrial base, civilian institutions of higher learning, financial institutions, and infrastructure (hospitals, power generation and water systems to name a few such targets).

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SOFWERX's "Combustion Chamber" of Innovation

Jim Ryan ■ Joe Chang

Recent years have seen increasing reliance by the Department of Defense (DoD) and Congress on innovations by small businesses and nontraditional suppliers and the use of prototyping to better field solutions for warfighters' dynamically changing needs. DoD's 2015 Better Buying Power Initiatives included the following tenets:

- Remove barriers to commercial technology utilization.
- Increase the use of prototyping and experimentation.
- Increase the return on and access to small business research and development.

In an August 2016 press release, House Armed Services Committee Chairman Mac Thornberry, Texas Republican, said: "The push to fund more experimentation and prototyping of weapons is not only an important step in simplifying and reforming the acquisition process, it is essential to our security, helping us keep pace with our adversaries, and maintaining the United States' technological superiority on the battlefield."

Ryan and **Chang** have been professors of Acquisition Management for the Defense Acquisition University's Defense Systems Management College at Fort Belvoir, Virginia, since 2010 and 2008, respectively.



Companies as large as Lockheed Martin Corporation and as small as local machine shop Tampa Technik competed to prototype solutions for this need.

In a nondescript Ybor City office building in Tampa, Florida, the U.S. Special Operations Command (USSOCOM) Acquisition Executive James "Hondo" Geurts is doing just that at a place called SOFWERX, which was created through a Partnership Intermediary Agreement (PIA) with the nonprofit Doolittle Institute to facilitate intermediary services between Special Operations Forces Acquisition, Technology, and Logistics (SOF AT&L) and industry, labs, academia and citizen-scientists. On any given day, representatives from small businesses, academia and citizen-scientists can come in off the street and into the approximately 10,000-square-foot facility. Here they will exchange ideas and information with SOF representatives and warriors to create what Geurts calls a "combustion chamber" for innovative solutions to SOF warriors' needs. He believes that "as the military gets smaller and smaller, there is a much smaller percentage of the community that understands the military—they want to help, but don't know how." And that is where SOFWERX comes in.

In his May 2, 2017, testimony before the House Armed Services Committee, USSOCOM Commander Gen. Raymond Thomas described SOFWERX: "There we have the opportunity for a collision of acquisition types, technologists and, most importantly, operators. You will find very current operational individuals who have the problem-solving ideas and ethos that's then married with academia, technologists and acquisition types so we can rapidly consider alternative sourcing, alternative problem-solving methods and really get to the crux of the matter of providing enabling technology to our force."

Welcome to SOFWERX

We recently flew to Tampa, visited SOFWERX and talked with Geurts about his vision, as he put it, to "facilitate the method to push out an idea and better inform the acquisition process." SOFWERX uses myriad events to achieve this vision. Among those are:

- OPENWERX competitions
- Tech talks
- Rapid prototype events and tech sprints
- Capability collaboration events
- Science, technology, engineering and mathematics (STEM) outreach
- Technology and industry liaison officer (TILO) and small business meetings

One of the many ways SOFWERX fosters innovation is through OPENWERX competitions. SOFWERX issues open invitation challenges to meet specific needs as a "competition for cash prizes." A recent example was provided on June 1, 2017, when the competitors for the Jump the Dog—Canine Oxygen Mask for High Altitude High Opening (HAHO) competition completed their presentations. Each competitor was asked to design a system capable of providing 100 percent oxygen on demand for canines during HAHO's 15,000- 35,000-feet parachute jumps. Prizes ranged from \$6,000 (for first place) down to \$2,000 (for third place). Companies as large as Lockheed Martin Corporation and as small as local machine shop Tampa Technik competed to prototype solutions for this need. After the judging was completed, Lockheed Martin won first prize with Tampa Technik taking third. Second prize went to Tampa Deep-Sea Xplorers, a privately held citizen-scientists corporation formed for the purpose of competing for the Shell Ocean Discovery XPRIZE, which also frequently takes part in OPENWERX competitions.

SOFWERX hosts a number of Tech Talks on various topics and in various forums. The week after our visit, SOFWERX sponsored a Big Data, Artificial Intelligence (including Machine Learning), Human Machine Interface and Human Machine Co-Evolution Symposium at Stetson University's Tampa Law Center. The more than 135 attendees represented all four Services, industry and academia. The symposium goal was to foster an appreciation of select emergent technologies and how their rapid evolution will impact, and can be used by, the Special Operations Enterprise. In a prior Tech Talk, SOFWERX hosted Dr. Virgil Griffith, a Dark Web subject-matter expert, and the Elliptic Blockchain Intelligence team for a discussion of the restricted-access Dark Web. Forty-six personnel from the Department of Justice, the intelligence community, SOCOM and U.S. Central Command (CENTCOM) were briefed on topics including cryptocurrencies and cryptocurrency tools, Dark Web user statistics, and techniques for cyber herding.

We began our tour by heading to the conference room at the rear of the facility, where we were briefed on SOFWERX's history and capabilities. Throughout the summer of 2017, this facility hosted a series of councils (warfighter, interagency and academia) focused on drones, swarms, effects and data science applications in preparation for the Thunder Drone Rapid

Prototype Event held from September through November 2017. Rapid prototype events are brief and use experts from DoD, academia and industry to advance technology through proof of concepts in shorts bursts, often using tech sprints. To aid in rapid prototyping, SOFWERX also has a 4,000-square-foot garage located nearby with some machining capabilities known as DirtyWERX.

Later in the day, SOFWERX would host a Capabilities Collaboration Event on Artificial Intelligence and Machine Learning (AI/ML). Capabilities Collaboration Events are monthly discussions of topics chosen by one of the SOCOM Program Executive Offices. During June's AI/ML event, SOF personnel shared with attendees some of their relevant experiences from a SOF perspective. These AI/ML experts outlined their capabilities and held a discussion aimed at expanding SOF capabilities through the use of AI/ML. That session concluded with a better understanding of both SOF needs and AI/ML capabilities. Future interactions are planned.

As we toured the SOFWERX facility, we met college STEM students working as interns and industry fellows who get the chance to apply their STEM skills in the rapid-paced SOF acquisition environment. SOFWERX employs both the interns and fellows as part of the company's STEM Outreach. SOFWERX also sponsors STEM summer camps and competitions for high-school STEM students.

As we departed from our SOFWERX visit, the TILO was meeting in a small office, just inside the front doors, with the representative of a local small business. That type of TILO and small business meeting is held every Thursday between 8 a.m. and 4:30 p.m. at the SOFWERX facility. The TILO assists businesses by discussing "How to conduct business with US-SOCOM" and the TILO provides the focal point for matching small business ideas or products with the correct USSOCOM acquisition office. A representative from the USSOCOM Office of Small Business Programs (OSBP) also joins these meetings to advocate on behalf of small business opportunities and helps Geurts meet his small business goals.

Throughout our morning at SOFWERX, we crossed paths with U.S. Army officers, SOF warriors, industry executives, small businesses, college student interns and industry fellows. The dynamic mixture of people discussing innovative technologies and their possible SOF applications fills the facility with energy, creating what Geurts described as "a mosh pit" for ideas. As we, in the DoD, seek to build strategies to better capitalize on innovations stemming from small businesses and nontraditional suppliers, SOFWERX provides examples of activities we could incorporate into those strategies.

For more information about SOFWERX, please visit the company's website at: <http://www.sofwerx.org/>



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GAO Rulings in Contract Protests

The Importance of Documentation

Janel C. Wallace, J.D.

The Government Accountability Office (GAO) was created by Congress in 1921. Until 2004, the government investigative and auditing agency was known as the General Accounting Office. Over its nearly century-long existence, the GAO has provided an impartial forum for protesting government contract awards and terms.

Most protests challenge the acceptance or rejection of a bid or proposal and the award or proposed award of a contract. There are other valid reasons for a protest that are centrally based upon some procurement action or inaction (see 4 Code of Federal Regulations [CFR], Section 21.0[c] and 4 CFR, Section 21.13[a]). Protests are based on an alleged government error. A finding of an error upsets those working in a government agency who believe they are conducting business appropriately.

Every year, GAO reports to Congress on its most prevalent basis for sustaining protests. It also advises Congress if any agency failed to follow GAO's recommendation(s). GAO's Fiscal Year (FY) 2016 report revealed that the rate by which the government's decisions were sustained increased from 12 percent in FY 2015 to 22.56 percent in FY 2016. This reflects an increase from 68 sustained protests to 139 sustained protests. The most frequently cited reasons for sustaining protests in FY 2016 were:

- Unreasonable technical evaluation
- Unreasonable past performance evaluation
- Unreasonable cost or price evaluation
- Flawed selection decision

These reasons did not change by much from FY 2015's most frequent reasons. In FY 2015, "failure to follow evaluation criteria" and "inadequate documentation of

"the record" were frequently cited reasons, and FY 2016 saw an increase in flawed selection decisions.

After reading the example opinions provided by the GAO it becomes apparent that inadequate documentation is a common underlying issue concerning the sustainment of protests. Reading each example opinion will help government agencies determine what was done correctly and what can be avoided or improved upon to reduce the number of sustained protests.

Deloitte Consulting, LLP

GAO provides Deloitte Consulting, LLP (B-412125.2, B-412125.3, 2016 CPD ¶ 119) as an example of an unreasonable technical evaluation. The main issues addressed in Deloitte include improper evaluation of key personnel, improper evaluation of past performance, organizational conflicts of interest (OCI) and unequal discussions. Defense Health Agency (DHA) (hereafter referred to as the "agency") awarded the contract to Data Networks Corporation (DNC) for Governance Requirements and Architecture Management Support. GAO found for the protestor on all of its grounds for protest except for the claim that there was a conflict of interest.

Evaluation of Key Personnel

The request for proposal (RFP) required that key personnel have a minimum of 5 years of experience. The awardee's proposal indicated that all key personnel

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had the requisite experience. However, this experience was contradicted by one of the resumés provided by the awardee. GAO determined that there was an unreasonable technical evaluation of the key personnel and rejected the agency's argument that it had fairly provided relaxed requirements to both the awardee and protestor. GAO recognized that the misvaluation prejudiced the award since the relaxation of the requirements for the key personnel was not equivalent for both the awardee and the protestor.

The protestor received a rating of "good" on its relaxed requirement whereas the awardee received a higher rating of "outstanding." The agency documented the relaxation of the requirement of the protestor's key personnel but did not do the same for the awardee's key personnel. The agency might have won had it provided an evaluation outline showing which offerors had relaxed requirements, which key personnel requirements were relaxed, and how the key personnel were otherwise deemed acceptable.

Evaluation of Past Performance

The protestor in Deloitte asserted that the agency's evaluation of the relevancy of the awardee's past performance references was unreasonable and undocumented. The protestor's argument was based, in part, on the fact that the agency increased one of the awardee's past performance ratings. The increase occurred without explanation after the initial evaluation to the final proposal revision. The GAO determined that the awardee did not update any part of its final proposal revision that would have justified the increased rating.

GAO also agreed with the protestor that the agency failed to provide adequate documentation that would allow GAO to review the reasonableness of the past performance relevancy evaluation and that this lack of proper documentation violated the requirements of Federal Acquisition Regulation (FAR) 4.801(b); 15.305(a) and 15.308. GAO explained that it will look to the whole record, but that it gives greater weight to evaluations conducted contemporaneous to the award evaluations than to after-the-fact agency responses to protests.

In Deloitte, the agency provided an initial evaluation rating to the awardee after it received information pertaining to its past performance. After discussions, the agency increased the rating without the awardee providing any additional information on past performance. The protestor argued in response that the increased rating given to the awardee for past performance after discussions was due to the agency's ability to obtain information it couldn't access earlier. The information received concerning the awardee was received prior to initial evaluations. The agency decided the information was more relevant to the requirement than initially thought. As a result, the agency determined, after discussions, that the awardee deserved a higher rating for that past performance.

GAO disagreed with the agency because of inconsistencies in the contemporaneous information provided. For instance,

the agency's argument that it could not reach the awardee's point of contact for the past performance reference prior to initial evaluations did not make sense because the agency did not document that difficulty even though it managed to document difficulties in reaching other references provided. The GAO's logic appeared to be that if such documentation were provided in one contemporaneous record, a similar situation also should have been documented. The awardee made no changes to the past performance reference in its final proposal revision after discussions were held. If the awardee made changes, there would be updated information supporting the increased rating. The higher rating was based on the agency's judgment and lacked a contemporaneous record supporting that judgment. The agency had to rely on its post-protest documentation in its effort to explain which aspects of the past performance and the requirement supported the given rating. GAO did not find the agency's argument persuasive and concluded that the past performance ratings were not reasonably based.

Unequal Discussions

The protestor's final ground for protest in Deloitte seems to be a flawed selection decision argument, alleging that the agency conducted unequal discussions. The protestor asserted that the agency informed the awardee of how its references were evaluated but did not equally inform the protestor about how its references were evaluated. Both the protestor and the awardee were equally rated in their past performance, yet it was clear to the GAO that the agency actions favored the awardee. The protestor's case for unequal discussions was supported by a Discussions Memorandum that was made a part of the record. In this case, the agency documentation showed that it did not treat the offerors equally and failed to provide a valid reason for doing so.

The GAO found that, although the agency held discussions with the protestor and the awardee, it acted in such a way that indicated it favored one offeror over another. This resulted in the agency losing on this part of the protest.

Conflict of Interest

GAO believed that the agency managed any potential OCI effectively. FAR 9.504(a) requires contracting officers (KOs) avoid, neutralize or mitigate potential OCIs prior to award. The protestor asserted that the agency already had two other contracts with the awardee and that, therefore, an OCI could not be mitigated. The awardee acknowledged it had a conflict of interest with one of its contracts with the agency and submitted a mitigation plan. The KO reviewed the plan and determined that there would not be a conflict of interest because the awardee would have completed the contract before beginning the performance of the new award. The protestor disagreed with the KO's assessment and argued that both previously awarded contracts created an OCI. The protestor highlighted two facts: (1) the contract for which a mitigation plan was submitted was extended to overlap with the beginning of the current contract's requirements and (2)

the other contract had similar tasks that overlapped with the awarded contract.

The protestor filed multiple protests regarding the OCI issue, resulting in the awardee submitting revised mitigation plans. These mitigation plans indicated "a remote, insignificant, potential OCI" concerning one of the contracts between the agency and awardee and "only a minimal potential OCI" concerning the other contract between the agency and awardee. The KO completed an OCI analysis memorandum indicating no impaired objectivity exists that would undermine the work performed by the awardee. The KO maintained in the new memorandum that there was not an OCI because the development work was completed prior to the current contract award and the contract allegedly causing an OCI—was scheduled to transition along with a related system to sustainment 3 months after contract award. GAO ultimately found for the agency.

The important provable facts that caused the government to prevail on the OCI issue were:

- The awardee, as the contractor on the current contract, would not be in a position to validate any work it performed on a different contract at any time.
- Tasks were not the same among the different contracts it held with the agency.
- Functional requirements did not overlap so that one contractor reviewed its own work or defined its own development requirements.

It was also important that the government acted to protect its interests by thoroughly determining and documenting the record so it could support its arguments.

Rotech Healthcare, Inc.

The GAO provides the decision in Rotech Healthcare, Inc., B-413024 et al., 2016 CPD ¶ 225 as an example of an unreasonable past performance evaluation. The protest resulted from a solicitation issued by the Department of Veterans Affairs hereafter called the "agency") for oxygen, durable medical equipment and some incidental services. The solicitation provided that the award would be made based on a "best value" determination and to the proposal that was "the most advantageous to the government, price and other factors considered." The evaluation factors and the possible ratings also were provided in the RFP. Past performance was considered to have significant importance, outweighing technical capability and price.

The agency considered the protestor and awardee equal in technical and past performance. All other offerors were rated lower, so that the protestor and awardee were the only offerors left in the competitive range. The agency awarded the contract based on the lowest price. The agency maintained that both the protestor and the awardee were equally rated in past performance and technical approach. Thus it claimed that price was the only determinant.

The protestor argued several issues, but GAO only addressed the protestor's complaint of unreasonable past performance and unequal discussions.

The protestor argued that the awardee's past performance was not rated appropriately since the awardee was given consideration for past performance on contracts that were not similar in size, scope and complexity to the solicitation. The value of the work being awarded exceeded \$10 million, whereas the contracts used to rate the awardee's past performance as "good" were no greater than \$5 million.

The GAO agreed with the protestor, who was also rated as "good," noting that the relevant past performance should have been similar in size, scope and complexity and that the agency was "required to consider, determine, and document the similarity and relevance of an offeror's past performance information as part of its past performance evaluation." There was no evidence that the agency conducted an adequate evaluation of the past performance information provided by the awardee because the evaluation wasn't documented in a way that would explain the similarities and relevance of the offeror's past performance. Contributing to the GAO's concern was the participation of one evaluator who rated the awardee as "excellent" and had experience in dealing with the awardee in a private-sector contract.

The past performance evaluation conducted by the government provided no documentation about the similarity of the private sector contract to the contracts being awarded. The agency might have won this basis for protest if, at the time of the award, it had provided and executed documentation that explained the relevance and similarity of the past performance information with the contract being awarded.

Unequal Discussions

The protestor in Rotech asserted unequal discussions, and the GAO agreed. The protestor claimed that, 6 months after the proposal due date, the agency provided the awardee an opportunity to confirm the original price offer or to provide different information. The protestor was not provided the same opportunity. The agency defended itself in asserting the contact to the awardee was solely for pre-award price confirmation and was necessary because of the significant time gap between the proposal due date and the planned date of contract award. The agency asserted that contacting the awardee prior to award was not prejudicial to the protestor because the government was not requesting a revised cost proposal.

GAO disagreed with the agency's position, finding that there would have been a new evaluation if the awardee had chosen not to confirm its price proposal. The language used by the agency in its exchange with the prospective awardee to "confirm the original price offer or provide alternate price information" clearly indicated the option existed for another evaluation. In its decision, the GAO discussed its "acid test" used to ascertain whether there were discussions. The key question is

whether an offeror is given an opportunity to revise or modify its proposal. In this case, only the awardee was provided that opportunity, which inherently constituted unequal discussions.

Valor Healthcare, Inc.

Valor Healthcare, Inc., (B-412960, B-412960.2, 2016 CPD ¶ 206) illustrated GAO's third most prevalent ground for sustaining protests—unreasonable cost or price evaluations. In Valor Healthcare, Inc., the incumbent contractor protested the contract award by the Department of Veterans Affairs' (hereafter referred to as the "agency") to Sterling Medical Associates for community-based, outpatient clinic services. The solicitation provided that a contract for a single base period and four single year options would be awarded to the offeror that provided the best value to the government on the basis of a tradeoff evaluation. The evaluation factors were provided in the solicitation. Price was listed as the least important factor and technical approach was provided as the most important. The KO reasonably anticipated that there would be at least two offerors, resulting in the use of price analysis. But the solicitation provided clearly that cost analysis could be used if a fair and reasonable price could not otherwise be determined. The solicitation described the price realism evaluation as "assessing the compatibility of proposed costs with proposal scope and effort." In order for the price to be considered realistic, it had to be based on what it would cost an offeror acting with "reasonable economy and efficiency" to perform the requirement. Two offers were received—one from the protestor and the other from the awardee. The agency determined that the prices of the offerors were competitive compared to other pricing within the same industry, and were fair and reasonable. This comparison and determination of fair and reasonableness constituted the reasonableness determination.

The protestor argued that the agency did not follow the solicitation when it failed to conduct a cost realism analysis of the awardee's pricing.

Nothing in the record indicated that the agency conducted a price realism evaluation as outlined in its solicitation. In a footnote, GAO explained the difference between determining price reasonableness and conducting a price realism analysis. Price reasonableness makes it possible to determine whether the offered prices are too high. In contrast, a price realism review is conducted to determine if the prices are too low. Price reasonableness is important in order to ensure that the taxpayer is not overpriced. Price realism is important in ensuring that the contractor understands the requirements and can realistically satisfy those requirements within the proposed price.

The protestor argued that, had the agency conducted the appropriate price realism review, it would have been able to determine that the awardee's price offer was unrealistic. This argument was compelling because the awardee proposed, without explanation, using the protestor's workforce already in place but at a much lower cost than that offered by the protestor.

An explanation would have been required in the event of a price realism analysis. The protestor argued that the awardee's unrealistic pricing added risk and that this should have decreased the awardee's rating on the technical approach.

GAO found for the protestor because the terms of the solicitation were not followed in the evaluation process. It is an agency determination whether it wants to include price realism language in a fixed-price solicitation. When it does include price realism language, the agency must conduct its evaluation consistent with that language. In other words, evaluate exactly what you say you are going to evaluate in exactly the way you say you are going to evaluate it. On the other hand, don't evaluate something that you don't tell the contractor you are evaluating.

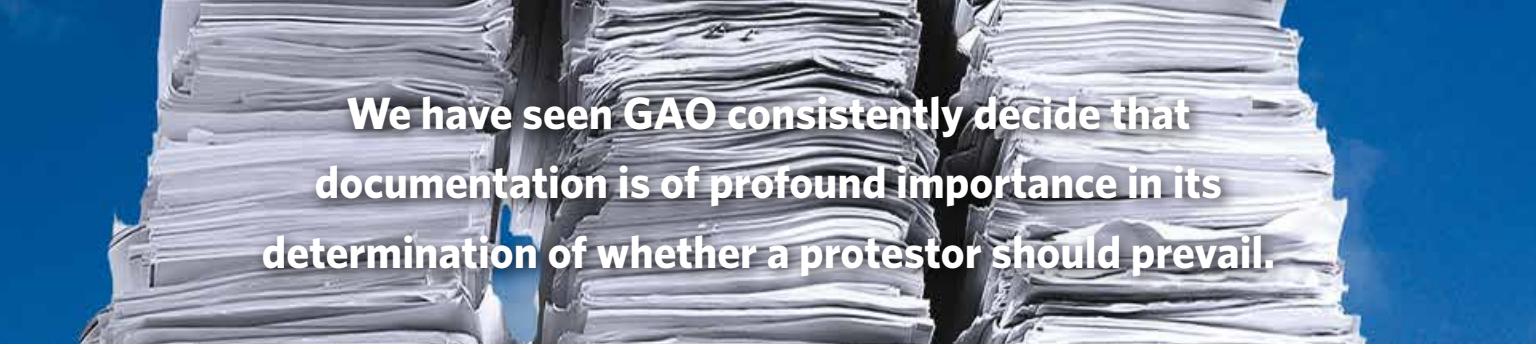
Once again a lack of documentation doomed the agency. The GAO could not find for the agency because there was no contemporaneous documentation to support the government's position. GAO might have been able to find for the government had the KO provided an explanation in a document contemporaneous with the contract award explaining why the KO believed the awardee's price to be realistic.

Past Performance and Technical Evaluation

In Valor Healthcare, Inc., GAO found that the government did conduct the protestor's past performance and technical evaluation reasonably. The protestor argued that its proposal should not have been assigned a rating of "good" but rather one of "excellent" as it was assessed as having numerous strengths and no weaknesses. The definitions of what is considered an "excellent" rating and or a "good" rating were provided in the solicitation. GAO declined to find for the protestor because the government acted consistently in applying ratings from the solicitation. The solicitation was written to provide the government with enough leeway for a reasonable judgment. The government documented its judgment adequately. The GAO would not substitute its judgment for the agency's unless the protestor could show that the agency acted unreasonably. The protestor in this case could not show that the agency acted unreasonably.

Castro & Company

Castro & Company (B-412398, 2016 CPD ¶ 52) was a GAO opinion that exemplified the fourth most prevalent ground for sustained protests in FY 2016—flawed selection decision. The Department of Transportation's Federal Transit Administration sought services for its Office of Budget and Policy. More specifically, the services sought were intended to help the agency comply with Federal Managers Financial Integrity Act (FMFIA) and Office of Management and Budget (OMB) Circular No. A-123 Appendix A. The agency solicited through the General Services Administration, posting a request for quotation (RFQ) that included a statement of work. The agency awarded a federal supply schedule order to AOC Solutions, Inc. Castro & Company protested this award. The protest concerned the point system the agency used in evaluating nonprice factors.



We have seen GAO consistently decide that documentation is of profound importance in its determination of whether a protestor should prevail.

The agency assigned each nonprice factor a different maximum of points.

The qualifications of key personnel and staff offered the greatest number of potential points. The relative importance of price to nonprice factors was not specified in the RFQ. However, there was language allowing tradeoffs indicating the lowest price might not be awarded the contract. Four evaluators prepared summary sheets of the nine offerors. Each evaluator reviewed the proposals, assigned a score to each factor and subfactor, and was given an opportunity to provide narrative comments to the side of each rating.

The protestor argued the evaluation of its proposal did not give any credit for the experience its key personnel and staff had with the FMFIA and OMB Circular No A-123, Appendix A. The agency ignored the protestor's FMFIA experience because it was provided in a part of the resumé that did not address experience. GAO found that the agency acted unreasonably by not considering the relevant experience noted in other parts of the resumés. The agency not only failed to consider the relevant experience; it assigned a weakness to the protestor for its key personnel and staffing. The weakness was based on one evaluator's comments who rated the protestor very low while the other evaluators gave the protestor very high ratings. Overall, the technical evaluation involved a mathematical average of the evaluator scores instead of a consensus on the part of the evaluators.

The agency's source-selection evaluation failed to explain the weaknesses and strengths, the negative marks of one evaluator versus the positive marks of other evaluators, or why the government was willing to pay \$298,000 more for the awardee's proposal than it otherwise would have to pay. GAO's decision explained that "an agency may assign adjectival ratings and point scores, but those are guides to—not substitute for—intelligent decision making." GAO determined that the agency did not consider all evaluations and only selected the awardee based on it having the highest average score and an acceptable price. The GAO found this unacceptable. Therefore, the protestor won its case.

Other Issues

The GAO used Castro as its example of a flawed selection decision. However, there were a couple of other issues protested. The GAO addressed the protestor's past performance evaluation, determining it was erroneous because it included a notation that was supposed to be omitted. The KO indicated

that the weakness was not reflected correctly in the source-selection documentation and that it would be omitted. The weakness was not omitted and was used against the protestor. The government argued that it considered that part of the evaluation to have been in error when it rated the protestor. However, the agency failed to document that it considered the error in its evaluation. The government tried to have the protestor's case dismissed, arguing that the protest was not submitted to the GAO within 10 days of the notification letter.

The government argued that the protestor knew or should have known the basis for its protest at the time of the notification letter. This argument failed because the notification letter did not disclose how the protestor was evaluated. The protestor had to request a debriefing on how its proposal was evaluated. But the agency wasn't required to give a debriefing on a federal supply schedule contract. The agency did provide a brief letter that outlined how the protestor was evaluated. The protestor was able only to determine the basis of its rejection from that brief letter. Had the agency provided a brief explanation in the notification letter, the government might have gotten the case dismissed as untimely.

Conclusion

Over the past few years, GAO has consistently highlighted the flaws in the evaluation process that have been the frequent reasons for the increase in agency protest setbacks. Many protests can be avoided by exercising caution in the evaluation process—such as the agency ensuring that it takes appropriate measures to resolve potential OCIs and evaluating only what was provided as evaluation factors and documenting rationale and results.

We have seen GAO consistently decide that documentation is of profound importance in its determination of whether a protestor should prevail. GAO will rely on the contemporaneous record, established at the time of the award, rather than a record supplemented during a protest. The contemporaneous record is considered more reliable and less likely to be modified to suit the needs of the government's defense. Documenting an evaluation and including all evaluations are required in order to defend against a protest but it also is a matter of good recordkeeping. Documenting the agency's rationale and providing fair feedback to contractors are business practices that should reduce the number of future protests and sustained protests, provided that we learn from our mistakes. &

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After Years of Evolution, There's Still Room for Improvement

Jay Mandelbaum
William F. Conroy III
Christina M. Patterson
Robin Brown



Which of the following two statements was made in the last 2 years, and which was articulated more than 25 years ago?

- A Department of Defense (DoD) directive (DoDD) stated that "DoD Components shall assure that timely actions are initiated when a development program or an end item production or support capability is endangered by the lack, or impending lack, of manufacturing sources for items and material."
- A Deputy Assistant Secretary of Defense "... expressed his concern over how Diminishing Manufacturing Sources and Material Shortages (DMSMS) were adversely affecting the readiness of weapon systems."

Mandelbaum is a researcher at the Institute for Defense Analyses (IDA) in Alexandria, Virginia. He researched obsolescence policy, guidance and training during the last 7 years and was instrumental in developing ways to use value engineering in resolving obsolescence issues.

Conroy is a professor of Life Cycle Logistics Management at the Defense Acquisition University's Mid-Atlantic campus in California, Maryland.

Patterson researched obsolescence policy, guidance and training during the last 7 years at IDA and earlier was involved in similar activities for systems engineering. **Brown**, who works in the Defense Standardization Program Office at Fort Belvoir, Virginia, became the Defense Department's lead on Diminishing Manufacturing Sources and Material Shortages (DMSMS) in May 2016. Earlier, she was the DMSMS Lead at Naval Air Systems Command (NAVAIR) and provided DMSMS support to all NAVAIR Program Offices for 15 years.



Actually, both quotes are more than 25 years old. The first is from 1976 and the second is from 1989. But both still apply today. Does that mean DMSMS management practices have not changed for more than 40 years? No, it does not. This article provides a snapshot of what has changed.

Before discussing trends in DMSMS management, we must establish a common understanding of what it encompasses. Per the DoD's DMSMS standardization document (SD) guidance (SD-22), "DMSMS management is a multidisciplinary process to identify issues resulting from obsolescence, loss of manufacturing sources, or material shortages; to assess the potential for negative impacts on schedule and/or readiness; to analyze potential mitigation strategies; and then to implement the most cost-effective strategy."

DMSMS management should be carried out in a risk-based, proactive way. Proactive implies that efforts should be undertaken to identify issues as early as possible, thereby providing a longer window of opportunity to resolve them. This is important because the earlier an issue is identified, the greater

the likelihood of a lower-cost resolution. Risk-based implies that monitoring activities to identify issues is not necessarily done everywhere. Monitoring should focus on critical items most susceptible to obsolescence and that take more time to resolve.

There are multiple major contributing factors in the evolution of DMSMS management. The first two factors examined here primarily are related to the underlying forces driving the need for DMSMS management. The remaining factors mostly are associated with performing DMSMS management operations.

- Military acquisition and system sustainment
- DoD-level DMSMS policy and guidance
- Proactivity
- Items monitored
- Automation
- Centralization
- Research skills
- Changes to DMSMS Management Drivers

Two underlying trends in military acquisition and system sustainment had a significant impact on the extent to which DoD systems face DMSMS issues:

■ DoD's reduced ability to influence industry to resolve DMSMS issues.

The semiconductor industry is a good illustration of this constraint since electronics represent a substantial portion of difficult-to-resolve DMSMS issues. In 1960, DoD acquisitions accounted for roughly 50 percent of the global semiconductor market. Such a large share of market demand meant that DoD had considerable leverage to secure an industry response to obsolescence. By 1979, DoD's market share had declined to approximately 10 percent, and its influence on industry therefore decreased dramatically. Today, DoD accounts for only 1 percent of the market. This loss of influence is exacerbated by the low-volume quantities of many DoD procurements.

■ DoD's increasing emphasis on buying commercial components for military equipment to lower cost.

A 1986 Defense Science Board (DSB) summer study concluded that there already existed many examples of DoD systems using commercial products and that the time then was ideal for greater commercialization. This DSB study was not the first to reach this conclusion; many other studies dating back to 1972 support commercialization. There were also studies conducted after the 1986 DSB that reached the same conclusion, the most notable being the April 1994 President's Blue Ribbon Commission on Defense Management known as the Packard Commission. As a result, the Secretary of Defense established a policy in 1994 aimed at decreasing the reliance on military specifications and standards. From a DMSMS perspective, increased use of commercial products and processes in DoD systems has resulted in obsolescence posing a major problem because long life-cycle DoD systems include a great many short life-cycle commercial electronics.

DoD DMSMS policy and guidance are also important drivers of DMSMS management. The following is a condensed chronology of major DMSMS-related events.

DoDD 4005.16 was promulgated on DMSMS management in 1976. It is reasonable to assume that the timing was at least partially associated with DMSMS problems posed by electronics on military systems; at that time, the DoD share of the semiconductor market was only slightly greater than 10 percent. The directive assigned responsibility for DMSMS management policy and guidance to the then Assistant Secretary of Defense for Installations and Logistics. The directive was not explicit about proactivity. It emphasized resolving issues promptly, before impacts to readiness and included approximately two pages of procedures.

The 1976 directive was revised in 1984. Responsibility for policy for DMSMS management was shifted to the Under Secretary of Defense for Research and Engineering. There also was a greater emphasis on proactivity—it included material about

not designing with obsolete parts, it mentioned source availability research, and it emphasized data exchange along with the early issuance of discontinuation notices. The number of pages devoted to procedures expanded to nearly nine.

The 1984 directive was replaced in 1991 by a DoD instruction (DoDI) on acquisition procedures (DoDI 5000.1). However, that new 562-page acquisition Instruction had minimal DMSMS management content. The standalone policy was eradicated ostensibly at a time of increasing DMSMS concern as evidenced by the 1989 quotation at the beginning of this article. That quotation is from a report that developed an action plan for "both reactive and proactive steps to ameliorate the impact of DMSMS on DOD weapon systems." It should be noted that at the time of the 1989 report, the Under Secretary of Defense for Research and Engineering was no longer acting as the DoD DMSMS management focal point as evidenced by the following statement by John Mittino, the then Deputy Assistant Secretary of Defense for Logistics: "I understand at your last symposium in Phoenix, Arizona, that there was a real concern about a lack of an Office of Assistant Secretary of Defense focal point for DMSMS. I want you to know that since that symposium I have volunteered to be that focal point."

All DMSMS management policy was not deleted with the cancellation of the 1984 directive. More than three pages of procedures have existed in a consolidated materiel management regulation since first published in 1993 (DoD 4140.1-R). Although the underlying documents have been renamed and updated along with some changes to the DMSMS management content, similar material remains in force today (DoD Manual 4140.01 Volume 3). In January 2015, one sentence on DMSMS was added to the logistics enclosure of DoDI 5000.2 as a result of congressional language found in Section 803 of the Fiscal Year (FY) 2014 National Defense Authorization Act. The same sentence was revised in 2017 to change the emphasis of the 2015 insertion in order to reflect the relationship between the existence of DMSMS issues and the risk of encountering counterfeit parts. In addition, another reference to DMSMS and counterfeit was included in an enclosure on cybersecurity.

Supplemental guidance documents associated with various aspects of DMSMS management operations were published between 1999 and 2005. The first Defense Acquisition University continuous learning course on DMSMS management was released on May 10, 2005. The first of five DMSMS management standardization documents was issued in 2006. In 2017, the Life Cycle Sustainment Plan outline was modified to include a table on obsolescence management as one sustainment strategy consideration.

Trends in DMSMS Management

Proactive DMSMS management (identifying issues as early as possible) often leads to lower-cost resolutions. DMSMS management proactivity has increased with the coming of the information revolution to DoD. In the 1970s, DMSMS



Today, as a result of the expanded automated capabilities and experiences supporting multiple platforms, the subject-matter experts utilizing the DMSMS management information systems can quickly provide high-quality research results.

management primarily was reactive. When an item became obsolete, DMSMS management practitioners searched (often manually) through parts catalogs for alternatives. Although the idea of proactivity was implied, the word was not used within the 1984 directive. By the latter half of the 1980s, as evidenced by the aforementioned 1989 report, the need for proactive DMSMS management became part of the standard vocabulary of the DMSMS management community. It was enabled, to a significant degree, by automated tools and databases. Proactive behavior remains extremely important today; many (but not all) programs engage in robust, proactive DMSMS management practices.

The types of items being proactively monitored have also expanded over time, most extensively in the last decade. In the 1980s and 1990s, DMSMS management primarily focused on electronics; commercially available databases of electronic parts were an enabler in monitoring such items. This focus expanded in the mid-2000s to encompass commercial-off-the-shelf (COTS) items and mechanical items because the prevalence of COTS assemblies in DoD systems had been increasing and predominantly mechanical systems were experiencing increased obsolescence due to their long (and sometimes extended) service lives. Vendor surveys and internet research were the principal data sources for monitoring COTS and mechanical items. The 2015 version of the SD-22 also contains guidance on DMSMS management for materials and software. A few programs have initiated efforts in the software arena; proactive DMSMS management practices for raw materials are less mature.

Trends in automation have led to meaningful improvements in DMSMS management practices. Commercial electronics databases provide information about the status of parts (e.g., when they have been or are expected to be discontinued), and sources, specifications, etc., were added to this information in the early 1980s. Over time, these commercial databases have become more accurate: They include more parts and more information about those parts. In addition, the companies providing those databases have increased the DMSMS management services that they offer. These databases have also been incorporated into larger DMSMS management information systems starting in the late 1980s, and, these larger systems

have themselves improved over time. For example, they have become more Web-based, their report generation capability has increased, they have incorporated data on non-electronic items as a result of vendor surveys, they have become more user friendly, and linkages have been established with logistics databases in order to estimate the date when an obsolete item will impact system availability.

The centralization of DMSMS management subject-matter experts within large DMSMS management service providers has also changed the character of DMSMS management. With rising automation, program offices increasingly have turned to the large and ever more capable DMSMS management information systems or other centralized providers of DMSMS management services for subject-matter expertise. In the 1970s and 1980s, individual program offices monitored their own items using their own staff subject-matter experts. These experts were called upon to manually research resolutions once an item was no longer available—an entirely reactive approach.

While a program office can still develop its own in-house expertise to perform DMSMS management functions by using the latest tools available, doing so generally is not a best practice. It will take time to train an in-house engineer on the tools and the intricacies of DMSMS management. People with great expertise, and many more years spent applying that expertise, can be easily sourced today from the organizations that provide the centralized DMSMS management information systems and/or centralized DMSMS management services.

Automation and centralization have yielded improved research capabilities to develop potential resolutions to DMSMS issues. Early DMSMS management practitioners in program offices and within the Defense Logistics Agency had substantial research skills. They were the first people called upon to verify whether an item could still be purchased, and, if not, to suggest possible alternatives. Today, as a result of the expanded automated capabilities and experiences supporting multiple platforms, the subject-matter experts utilizing the DMSMS management information systems can quickly provide high-quality research results.

Summary

Since 2001, when the last DoD DMSMS management directive was canceled, the only official DoD DMSMS management policy has been a limited number of procedures included in material management/supply-chain issuances and one sentence in acquisition policy that appeared in 2015 and 2017.

Yet despite limited formal policy, there have been significant trends in DMSMS management capability over the years. To some degree, the capability has kept pace with the greater demands for robust, proactive DMSMS management resulting from the increased complexity of new weapon systems, the greater use of COTS assemblies, and the extension of the life cycle of older platforms.

DMSMS management guidance has similarly kept pace. The DMSMS community has demanded improved DoD guidance—and that demand has been met. The first SD-22 was published in 2006. The current SD-22, published in January 2016, was the fifth version issued in a 10-year span.

What's Next?

Even though there have been many advances, there always is room for further improvement. Additional benefits seem achievable because numerous interviews of DMSMS subject-matter experts and DoD program management personnel revealed that a risk-based, proactive approach has not yet been adopted by all programs.

According to Eric Grothues, the DMSMS management lead for the Department of the Navy, "DMSMS has impacted virtually every weapons system throughout DoD. A DMSMS management policy requiring programs to develop and implement a process that is well grounded on proactive DMSMS management principles, tailored to mitigate the programs specific obsolescence risks, would provide program managers with the traction needed to get their weapons programs up to speed."

As more and more programs begin to pursue a risk-based, proactive approach to DMSMS management, there will be further cost reductions and fewer schedule slippages and readiness impacts due to DMSMS issues.

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Defense AT&L

WRITERS' GUIDELINES IN BRIEF

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